Vic COMPUTING

NEW: 64 Page Punters Progress

THE MAGAZINE FOR COMMODORE'S SMALL COMPUTERS DECEMBER 1982 Vol 2 ISSUE 2 95p

CHRISTMAS SPECIAL

Commodore's Plans Unveiled Software Catalogue Continued Victuals and Routines Todd on magazine listings

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"A REAL ACTION SHOT OF THE GAME"

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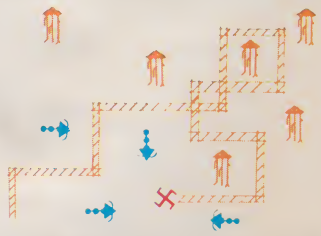
FOR UNEXPANDED VIC 20

You are in shark infested waters after being thrown overboard from a pirate ship. Your only protection being an atomic net which you trail behind you, trying to cover all the visible ocean and ensnare the sharks at the same time. Beware of stopping or covering your tracks for too long, if you do, then the sharks will escape and come after you. Watch out for the ever increasing deadly octopi (sometimes the sharks will eat part or all of one!).

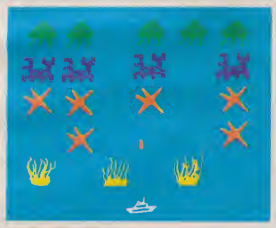


"A REAL ACTION SHOT OF THE GAME"

NEW NEW NEW NEW NEW NEW NEW NEW

SEA INVASION

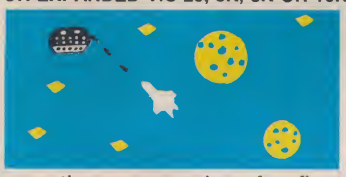
FOR THE UNEXPANDED VIC 20



Fight off the attacking sea creatures for as long as you can. Shoot the whale for a surprise score. Watch out for the crabs, starfish, & octopi !!!!!!!!!!!!!!!!!!!!!!!!!!!!

MOONS OF JUPITER

FOR EXPANDED VIC 20, 3K, 8K OR 16K



You are the commander of a fleet of destroyers... Looking on from the safety of mother ship, you send in one destroyer at a time to blast a passage through the moons of Jupiter. Your destroyers have to dodge, and blast the "U.F.O's"... Watch out for the 'Gologs', they can smash your destroyers, but you cannot harm them ....

SPACE ATTACK

FOR THE UNEXPANDED VIC 20

Space attack is a game of skill, you, as the pilot of an intergalactic battleship, have to fight your way through wave after wave of various alien space ships

MIND TWISTERS

FOR UNEXPANDED VIC 20
FOUR GAMES TO STRETCH YOUR BRAIN

Blackjack, Decipher, Four Thought and Teaser are our computerised versions of very popular home games and will test your mental agility and skill for many a long hour.

BLACKJACK:-
You start with £1,000, the objective being to break the bank, to do this you have to win (including your starting money) £20,000.
Instructions: You have to score nearer (but not over) 21 than the computer does. The computer deals your first card, you then place your bet and hit the return key, the computer then deals your second card. If you want another card hit the "C" key, if not, hit the "S" key.
Points: Ace = 1 or 11, Jack, Queen, King = 10.
Scoring 21 points with 2 cards — you automatically win.
Scoring 21 points or less with 5 cards — you automatically win.
Draw — the computer wins.
Your kitty is automatically adjusted win or lose. If you lose all your kitty — game over.

DECIPHER:-
You have to guess what combination of colours the computer has selected — to enter a colour just hit the colour button on the computer, when you have entered your 5 choices of colour, the computer will display (A) Nothing at all = None right, (B) Black or White Squares or Both — For every black square you will have a correct colour in the correct position, for every white square you will have a correct colour in the wrong position. If you cannot find the complete combination, it will be displayed when you have had twelve attempts.

FOUR THOUGHT:-
You have to make a line of four squares — horizontally, vertically or diagonally BEFORE the computer does, taking turns to take a square (squares can only be placed at the bottom of the grid, or on top of another square). **Keys:** Hit the number key of the column you want your square dropped in then hit the return key.

TEASER:-
The aim of the game is to score "15" BEFORE the computer does, using any combination of 3 boxes. If you cannot score "15" then you must try and stop the computer from doing so and force a draw. **Keys:** Hit the number key of the box that you want (you can only select an empty box).

MULTISOUND SYNTHESIZER

FOR THE UNEXPANDED VIC 20

The Vic Multisound Synthesiser is very flexible and can be played in more ways than can ever be explained here, to create music and special effects. For example, create any tune, up to 255 notes (after following appropriate instructions), then press "F1" or "F3", then key "9" and enjoy the added effect. Now hit "+", listen to the difference. For a surprise — hit "—". Now add a melody over the top — hit key "8" then "7" — now play a melody, or experiment. *Have fun!*

Our games are available from all good home computer shops, including: all Laskys branches, Micro C, inside Currys at: Birmingham (233 1105), Leeds (446601), Luton (425079), Nottingham (412455), Southampton (29676), inside Bridgers at: Bristol (650501), New Malden (01-949 2091), and at: Leicester (546224), London (387 9275), Manchester (834 0144), Micro-C, Chromasonic Electronics, 48 Junction Road, Archway, London N19 5RD (01-263 9493/263 9495, Telex 22568), Maplin Electronic Supplies Ltd, P.O. Box 3, Rayleigh, Essex (0702 552911/554155), Gemini Electronics, 50 Newton Street, Off Piccadilly, Manchester M1 2EA (061-236 3083), Gamer, 24 Gloucester Road, Brighton (698424), Vic Centre, 154 Victoria Road, Acton, London W3 (01-992 9904), Metyclean, 137 The Strand, London WC2 (01-240 2321), Metyclean, 177 London Road, Croydon (01-686 8626), Metyclean, 92 Victoria Street, London SW1 (01-828 2511).

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Contents

Eye on Commodore 2

What's going on at Commodore? Will the Vic be replaced? Will there be a cheap upgrade to the 64? We venture into the East Turret of Commodore Towers to interview one John Baxter, marketing manager of that ilk

Victuals 9

Two interesting items from the influx — a long but pretty good game that features a listing on the ZX printer; and a handy 'FIND' programmer's aid facility from Tim Duncan

Punter's Progress 13

Intrepid explorer of the Vic and indefatigably average reader J D Collins lifts the lid once again, recanting some of his views about games programs and infecting his family and friends with Vicness

Extending the Arfon Expander 15

Now that the future of the Arfon add-on seems more secure, we're happy to have this little modification from Chris Durham that allows you to switch from one slot to another — and thereby gets over a deficiency of the standard unit

An introduction to user-defined graphics 17

The basics of getting your very own characters and symbols from a fevered imagination on to the Vic display. Trevor Pitts leads the way with an easy-to-understand introduction

The Compleat Software Catalogue — Part Two 20

The rest of the round-up: all the software we could find from independents in the second half of the alphabet, plus Commodore's own.

The 64 Page 29

Starting a regular spot for Commodore's new baby — well, they claim 10,000 64s will be on the streets by 1 January. Steve Beats follows up his review in the last issue

Todd's Lore 33

Mike Todd tells you how to get 450 mistakes for a quid, then offers some wise words about keying in games programs from computer magazines (they don't always work, you know)

A Matter of Routines 35

Back by popular demand and laden with goodies to incorporate into programs — all contributed by you the readers. Keep 'em coming!

Tommy's Tips 39

Our resident Vic expert handles queries on protecting programs, why Vics won't work (or not), Pet-to-Vic conversions: and more bugs, funnies, and hints

Editor
Dennis Jarrett
Workers
Hywel David, Kirk Poland
Subs Manager
Annabel Hunt
Ad Manager
Cathy Lane
Production
Rock Storm, Maggie Underwood
Art and design
Karen the Black Douglas, Paul Hulme
Front Cover
Rogue Images
Limbs
Jane Munro
Box
Chromasonic
Old master
Julian Allason

Telephone: 01-607 9489 (all departments)

Vic Computing is published six times a year by Paradox Group, 39-41 North Road, London N7 9DP. Annual subscription: £6 per year (UK), £IRL 8.50 (Eire), £9 (Europe), £16 (rest of world). Printing by Thamesmouth Printing Co Ltd, Southend-on-Sea, Essex; Phototypesetting by Carlinpoint Ltd, London WC2E 9NW.

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Eye on Commodore: Interview

by Henry Deckhand

John Baxter is Marketing Manager of Commodore Business Machines. That makes him Vic Supremo for these isles. So we thought it was about time that the readers of Vic Computing should hear his views on life, art, the meaning of the universe — and the current position of the Vic, particularly in relation to the forthcoming 64 and Max.

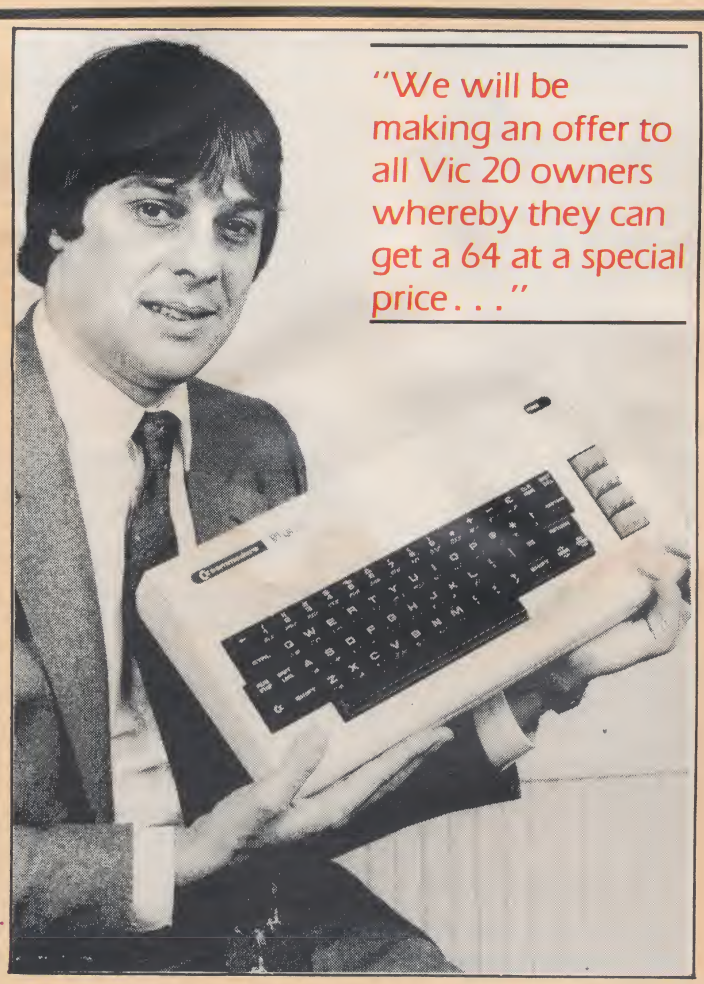
Vic Computing: How many Vics have you sold in total now?

Baxter: Effectively since 1 January 1982 we have sold 60,000. I would guess between 100,000 and 130,000 by the end of this year.

Vic Computing: What will happen then?

Baxter: Well, we are already trying to source more Vics from Germany or other locations to ensure enough stocks — there isn't a problem but we are just trying to prepare ourselves in case. At the moment sales are going extremely well and we are extremely pleased — we sold about 12,000 last month.

Vic Computing: Vic's quite unusual among home computers in that it has never had a major upgrade in its life. As far as I know the only major change in Vic has been the addition of things like extra peripherals and software and a change from one keyboard to another . . .



"We will be making an offer to all Vic 20 owners whereby they can get a 64 at a special price . . ."

"Screen legibility was a major consideration in going for 22 characters . . ."

Baxter: That's absolutely right. Commodore has quite a lot of experience in making microcomputers and it does help — so unlike many other people who launch a product with a lot of bugs we had virtually none. And that's why we've never had to change the product. There are some bugs in it, but they are very minor and only a very experienced programmer will find them.

Vic Computing: How have you been answering the single major criticism of the screen size?

Baxter: Well, there is already a large number of complaints coming in about 40 column machines. To be able to use a 40 column screen you have to sit within two or three feet of the television — further away you just can't see the characters. This was a major consideration in us going for 22 characters: you can be quite a long way from the TV and still use it. And there is some question of the radiation from TVs being harmful if you are right on top of it. At the moment we are trying to find out if there is any research on this — I'm not certain of all the details, but many other countries don't allow these radio emissions to come from the TV; they have to be shielded.

Vic Computing: What are the big sellers among the add-ons at the moment?

Baxter: Cassette decks are number one. A lot of people ask why we don't just do a general-purpose cassette interface, but I think everyone knows the problems of loading from all sorts of different cassette decks — and the one thing we do get with ours although it may be slow it ain't half reliable. It loads virtually every time. And that's important: there is nothing more frustrating than finding you can't load programs.

Vic Computing: Are you selling a lot of paddles?

Baxter: Not a huge number. There is a limited number of games for which paddles are useful for paddles. Joysticks and keyboards seem to cover most applications.

Vic Computing: How about big-sellers on the software side?

Baxter: By far the largest sellers are *Introduction to Basic Parts I and II* — something we predicted would happen, and the reason why we spent so much time on them.

Vic Computing: How many *Part Is* have you sold?

Baxter: To date the worldwide total is about 200,000. And in the UK alone I think we've sold about 30,000 to 40,000. That's a lot when you compare the number of Vics sold to date. Part II has been only going a little while but currently it's outselling Part I.

Vic Computing: And other products that you're selling?

Baxter: The Super Expander is probably selling the best among the programming tools, followed by the Programmer's Aid and then the Machine Code Monitor. The Super Expander has sold about 7,000 or 8,000 — which is fairly high, as you really have to understand Basic to use it effectively. Around 6,000 Programmer's Aids and 4,000 Machine Code Monitors have been bought . . .

"I would guess we will have sold between 100,000 and 130,000 Vics by the end of this year"

Vic Computing: What else sells well?

Baxter: The games packs. Omega Race is a good example — only launched three months ago, and sales are excellent. It's an excellent game, too; it is one of the top arcade games in the States and we have an exclusive deal with Bally to produce it. The interesting thing is that once a program developed in Japan or wherever became a hit there, then took a year to get to the States and another year or so to reach the UK: but now we find we are able to convert so fast, mainly because many of them were written on 6502s anyway, so that as soon as it becomes a hit in the arcade we can get it out on the Vic within three months.

The products which are beginning to overtake the standard 'Invader' type games are Sargon Chess and the 'Adventure' series. They are 'mind' games, there's no graphics in them at all. I think this is because of the type of person who has bought a Vic — it is not just a computer for kids. Maybe the parents bought it originally for the child to play games or to learn programming. But now it's almost as much the mum and the dad who are using it.

In fact the traditional games *just*

"We don't see the 64 replacing the Vic . . ."

aren't selling as well as we originally thought they would. Products like Mastermind, Quizzmaster, Robert Carrier, Know Your Own IQ, the GCE revision programs — they are going extremely well. I don't think there was a game product on our top ten last month — the top one was Sargon Chess.

Vic Computing: Let's talk about the future products a bit. What's the delivery position on the 64?

Baxter: They will be at the dealers during November; we expect that by Christmas about 10,000 will have gone out.

Vic Computing: Where are they being made for the UK?

Baxter: Braunschweig in West Germany.

Vic Computing: And how is the 64 going to impact the Vic?

Baxter: I don't think it will. For one thing, unlike some of our competitors we are finding a large number of Vic owners will want to go on to our next product. We've found very few bugs in the 64, it works very well and it does exactly what we said it would do. It is more powerful than a lot of business computer systems on the market today; in fact, if it was an 80 column machine — which we will in fact be making — it would compete with a large number of existing business computers today.

It has a number of features that are unique and very advanced: the sound chip alone is absolutely phenomenal, there is nothing to touch it on the market today. We have several orders from people who say the music chip in there alone is, better than the synthesisers they have.

But we don't see the 64 *replacing* the Vic 20, for several reasons. One is that it is more than a 'personal' computer; it has 64K RAM, it has a number of advanced features, it will link to dual disk drives and daisywheel printers, it will have a Prestel link early next year . . . and it will be a really *professional* computer.

Commodore doesn't just produce one computer and say 'that's for everybody — it's suitable for business use and for home use and for everything else'. No computer can be everything to everyone; the requirements of a laboratory or a graphics units or word processing or games are all different.

We see the market as various different segments. The video-game computer will die out very quickly because with a micro-processor in there anyway you can give it a keyboard and make it into a real computer at the same price. For that market Commodore has the Max, which will be a superb 3D games-player with sound and graphics — but it also has a mini-Basic for programming. Price will be about £100. Then we have Vic 20 retailing at the moment between £150-£170.

And there's another product, as yet unannounced. And we have the Commodore 64 at the top end. That's our 'personal' range, before we get to the business products.

We try to make all our products upgradeable. So Max cartridges will fit the 64: the Vic printer and the disk drive will also work on the 64 — the disk will need one simple ROM change right now, and in the future we'll avoid even that. We are not trying to build in obsolescence into the machine.

The Vic is still selling extremely well and we expect to still be selling it even up to June next year. But at some stage we'll be bringing in a product to replace the Vic 20 — which certainly isn't the 64, because that's a much more powerful computer and is aimed at the top-end.

Vic Computing: So the product to replace the Vic 20 will use the same cartridges as the Max, the 64 and so on?

Baxter: Exactly. We are trying to create a full range which is totally compatible. It would mean that a program written on the 64 will not work on the machines below it, because it would use the 64's extra features; and the same applies to the new product in the middle. Whereas a product written for the Max will work on any of the others.

Incidentally, the new 64 programs may use all 64K and are for complete home help — education, business, and so on. They will come on to the market I would guess at Spring next year; they are extremely complicated programs, very long and very factual, and we reckon it will take six or nine months to write them.

Vic Computing: There's no problem about running Vic programs on the 64?

Baxter: The Basic is the same but some of the locations are different, so if you use PEEKs and POKEs and so on you'll have problems because some of those locations have changed. But it wouldn't be hard to make a Vic program work on a 64 — if you want to: the power of the 64 is so much greater, and the facilities are so extensive. If you have a simple two-dimensional game it makes poor sense not to convert it to use the sprite graphics, the sound, the 3D capability of the machine.

Vic Computing: So will you be offering current Vic owners any incentive to change their machine?

Baxter: It is always difficult. We've already had complaints — which I think are unjustified — about the price having dropped since people bought their Vics. But this applies to TVs, home computers or even business computers. When we first launched the product we didn't know exactly how many we were going to sell. Of course the more you produce the cheaper the costs become because you start to recover all your R&D costs. So the price can come down, and it's only right that it should.

But the trouble with saying 'in that case I shouldn't have bought it, I should have waited' is that you could be saying that for ever. There will *always* be a more powerful computer coming which is better value for money.

As for the question of replacing the Vic, we will be making an offer to all Vic 20 owners whereby they can get a 64 at a special price. We'll probably want them to return their Vic and we will send them a brand new machine. It will cost between £100 and £200 — the reason it's flexible at the moment is because we don't know what we are going to do with the Vics when they come back.

"The upgrade offer will cost Vic owners a fraction of the price of a new 64 . . ."

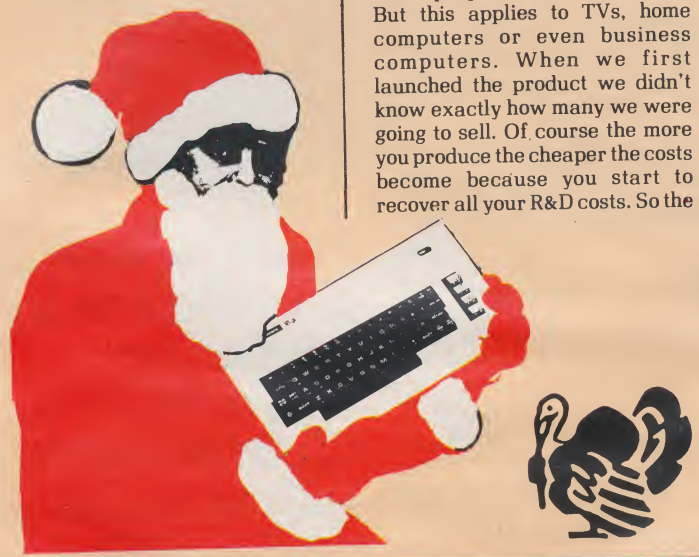
It's not easy to upgrade a Vic physically to a 64, because we have to make changes to the casing and it's not sensible to cut the plastic. And I can't guarantee a time either.

But there *will* be some kind of upgrade offer, and it will cost Vic owners a fraction of the price of a new 64. It's going to be done simply as a service to them — I think that we will be the first and probably the only company that will ever do that.

In other words anyone who buys a Vic today needn't worry. He or she won't find themselves disappointed that the product's out of date in nine months time and wishing that they'd waited for a 64.

Vic Computing: But you have no idea when you'll start doing this?

Baxter: Well, I'm sure you appreciate that to actually run something like that is a logistic nightmare. Because all the Vics will have to come back to us, and I'm going to have to work out a system by which we can actually do it. We don't expect the quantity involved to be that high, because most people buy a computer for what they can do *today* and most are quite happy with what they've got.



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Telephone: Slough (0753) 79292.

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VCVCO 12/82

80 columns — and more

You just can't keep down those people at Stack Computer Services. The latest from their Vic enthusiasts is an exciting new cartridge for the VIC-20: "SUPERCHARGER PLUS offers all the tricks we've learnt for the Vic-programming short-cuts, the easiest graphics around, saves time and labour".

SUPERCHARGER PLUS includes all of the graphics and 'tookit' features of VICKIT 1 and VICKIT 3 plus the 3K extra RAM you need for graphics: it costs £49. The version of SUPERCHARGER without the 3K is £45.

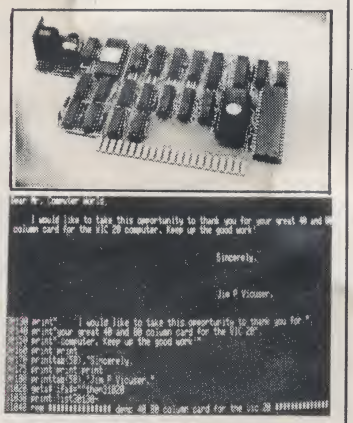
80 columns from Stack . . .

Even better is a new 40/80 Column board for the Vic. This gives you a 40-column display on a TV in monochrome, or 80 columns on a professional monitor — which means a clear display and double (or quadruple) the amount of data displayed. The result is easier editing, at the very least: and word processing on 80 columns really is preferable.

"The Vic 20 can now be classed as a micro with facilities to compare with more expensive business micros", say Stack. £99.99 plus VAT is the price.

Stack is on 051-933 5511.

We've heard of another 40/80 column add-on: it comes from Computer World in Holland, something of a haven for Vic enthusiasts.



. . . and from Computer World.

The Computer World cartridge has a 40 or 80 column display (switchable from Basic without losing any program in memory). Vic graphics, upper and lowercase (with true descenders), full cursor control, and program editing in 40 or 80 column modes are all supported. It costs $249 and Computer World is at Hilvertsweg 99, 1214 JB Hilversum, Netherlands.

A better printer?

DRG Business Machines has a graphic printer for the Vic that offers a good deal of extra capability at a quite small increase in price over the 'official' Vic printer.

It also comes from the same manufacturer. A Japanese company called Seikosha makes the Vic-1515 printer, and it also sells more or less the same unit without a Vic interface as the Seikosha GP-80. DRG's unit is the next one up in the family, provided with the Vic connections and called the GP-100VC.

The specification looks like the 1515's — 80 characters a line, dot matrix action, 30 characters per second print speed. So what's so special about it? Well, in addition to the standard Vic alphanumerics and all the graphics symbols you get a fair-to-good graphics capability.

In fact at the price it's an **excellent** graphics capability. The GP-100VC lets you mix graphics, alphanumerics and double-width characters on the same line, too. And there's a single command to repeat graphics output if you want.

All in all a neat little unit — and priced well at around the £235 mark, depending on how much of a mark-up DRG's local dealer decides to take. Call 0934 416392 for your nearest dealer.

Fixing Vic

Ever thought of the possibility of your Vic requiring attention or repair *after* your one year guarantee expires? Probably not, as the Vic is proving to be pretty reliable. But god's Law says that it won't last for ever; the cost of fixing computers can be pretty high, especially in relation to the Vic's quite modest purchase price.

Commodore has fixed up a deal with one of the leading insurance companies, Domestic & General, to organise a scheme that extends the full guarantee period to **two** years from date of purchase.

The scheme has apparently proved very popular. To get peace of mind and protection the premiums will cost you £20 for the Vic, £25 for the printer and £35 for the 1540 disk. Vicsoft members get a discount.

VICSOFT — Commodore's mail-order club

Vicsoft is Commodore's mail-order club for Vic owners. When you registered your Vic guarantee with Commodore you became eligible for membership; in any case, all Vic owners who have returned their guarantee cards will receive the Vicsoft catalogue four times a year.

In addition to offering you products (from Commodore and some 'approved' independent suppliers) to use with your Vic, each issue contains hints, tips and information that should add to your understanding and enjoyment of the computer. The catalogue prices are not all discounted, but each issue does contain some special offers for Vicsoft members — and they may be enough to justify the £5 pa joining fee.

In any case, it's probably worth using the catalogue to buy the things in it — rather than shopping around for them from individual dealers. It's 'one-stop shopping', with a single form to fill in and postage included in the prices.

The Autumn issue, the First, is still out now. Future issues of the catalogue will contain special offers which include computer camps, competitions, training courses, visits to computer exhibitions — all at special members' prices. Vicsoft members will also be given the first opportunity to purchase many new Vic 20 products as they are introduced by Commodore.

If you haven't seen the catalogue, try calling Slough (0753) 73638 and ask for a copy.

Legal Dept: Atari still has a court case scheduled against Commodore claiming infringement of copyright on the PacMan game, but that won't be heard until the middle of next year. Meanwhile round one has gone to the Commodore: Atari has withdrawn its motion for a temporary injunction to stop sales of Jelly Monsters. Why? Well, we think it's because a similar case in Hong Kond went against Atari recently: and HK precedents can apply over here.

'Computers are Wonderful' Dept: "A computer club enrolling 150 members within a week of launching, plus huge demands in the area for any information on home computers has convinced Sutton Libraries that the boom is here to stay" it says here. They are holding a Home Computer Fair in the Central Library, Sutton, on 20-22 January 1983. It's being supported by the Association of London Computer Clubs and there are no admission charges.

Cheap colour plotter coming? Buried in the vaults of Commodore Towers there's a good-looking printer/plotter that will probably be officially on sale in the new year. It will cost around £160, and we think that's amazing value — particularly as it's a colour plotter. Resolution is good but not great: but what do you expect at the price? It comes from a Japanese company called Alps, which also makes the 1540 disk for Commodore: it uses 6in-wide paper and four coloured biros. Yes please, Daddy.

Oops: Our 'correction' for a bug in the **Programmers Reference Guide** itself included a mistake. Try again: on page 89 line 20 in the bottom program shoud read **FOR L = 0 TO 7: FOR M = 0 TO 7.**

Arfon back: And now the good news — the Arfon expander board is back in production. Torch Computers, which builds a kind of business version of the BBC Micro, has acquired the now-defunct Arfon. 25 people have lost their jobs, but 15 are still there beavering away on the add-on.

Clever chip: Commodore is reportedly working on an extraordinary microprocessor chip called the 650000 (or 65000 — what's a zero or two between rumour-mongers?). It's a high-tech big-machine processor, an eight-bit device that manages to approach the performance of 32-bit processors by clever use of multiple eight-bit chips: and it would sell for $6 to $12 in quantity, which makes it really cheap for such things. Cheap enough for the Vic?

Sumlock microcomputer world

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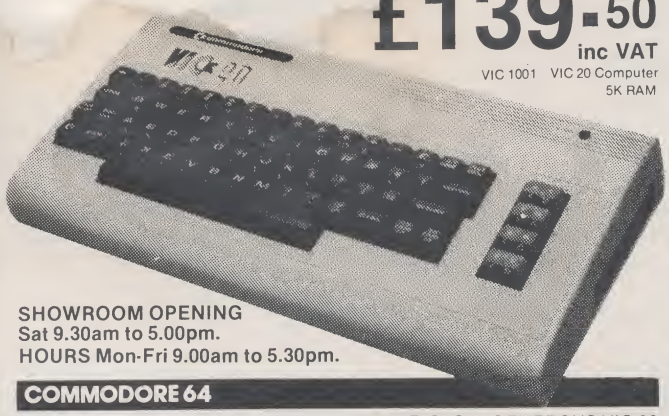

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Using Joysticks on the Vic
by Chris Preston

One of the interesting features of the Vic is the possibility of adding a joystick for extra realism in 'simulation' games.

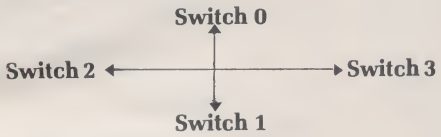
Without a joystick you have to rely on four standard keys in a diamond shape to move the cursor or some other object on the screen.

But it is all too easy to hit the wrong key in the heat of the moment and send your lunar lander crashing into the surface of the moon. How much easier it would be if you had a control stick just like that on an aircraft!

There are two possible kinds of joystick which can be added to a Vic. Both types plug into the game I/O port.

Switch joysticks

The simpler (and cheaper) type of joystick consists of four switches, again arranged in a diamond shape:



Normally the joystick is in the central position and none of the switches are closed. If you push the stick away from you, switch will close; if you move it to the right switch 3 will close.

Fancier versions will also have another advantage over the 'four keys' method in that if you push the stick forward and to the right at the same time, switches 0 and 3 will both close.

There is also a 'fire' button, for shooting down the dastardly invaders.

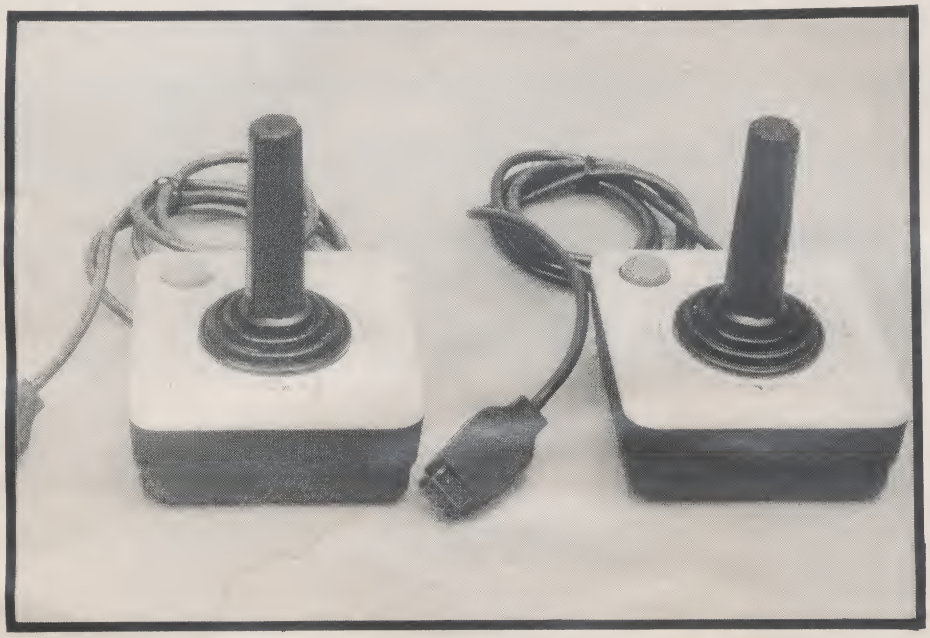
So how do we program this device? Well, inside the Vic there are two powerful I/O chips called VIAs (and numbered 6522 as the MOSD Technology part). Switches 0, 1, 2, and the fire button are connected to VIA 1, while switch 3 goes to VIA 2.

A VIA has (among other things) two 8-bit output registers, A and B. Each line in each register can be individually programmed to be an input or an output, by writing a value into another register called the Data Direction Register.

There are two of these, one for output register A and one for output register B. To set a particular line in say register A to be an output, we write a '1' bit to the corresponding bit in the data direction register; a '0' means that the corresponding bit in the output register will be an input.

Here is a table showing which bits in the two VIAs we are interested in:

Decimal	Hex	Function
37137	$9111	Output Register A Bit 2—Switch 0 Bit 3—Switch 1 Bit 4—Switch 2 Bit 5—Fire Button
37139	$9113	Data Direction Register A
37152	$9120	Output Register B Bit 7—Switch 3
37154	$9122	Data Direction Register B



To read the joystick, we need to set the corresponding bits in the two ports above to be inputs. Here a tiny little snag crops up. Port B on VIA 2 is used as a column select for the keyboard — which means that if we are using the joystick, the keyboard will be partly disabled (the keys which will not work are: 2 4 6 8 0 — and CLR/HOME). So the data direction registers should always be restored after you have finished with the joystick.

Here is a sample program showing the principles of how it works:

```
1000 POKE 37139,0 : POKE 27154,127 :
   REM SET UP DDRs
1010 A = PEEK (37137) : REM LOOK AT
   VIA.
1020 IF (A AND 4) THEN PRINT
   "SWITCH 0"
1030 IF (A AND 8) THEN PRINT
   "SWITCH 1"
1040 IF (A AND 16) THEN PRINT
   "SWITCH 2"
1050 IF (A AND 32) THEN PRINT
   "FIRE BUTTON"
1060 A = PEEK (37152) : REM LOOK
   AT VIA 2
1070 IF (A AND 128) THEN PRINT
   "SWITCH 3"
```

This is OK for getting the feel of how the joystick operates, but what we want is a way of converting a program from the 'four keys' method to the joystick. It is obviously difficult to give a completely general solution as every program is written differently, but typically there will be a GET statement to test the keyboard followed by a number of IF statements to see if a key has been pressed. For instance:

```
1000 GET A$ : IF A$ = " " THEN 1000
1010 IF A$ = "I" THEN 1100
1020 IF A$ = "J" THEN 1200
1030 IF A$ = "K" THEN 1300
1040 IF A$ = "M" THEN 1400
1050 IF A$ = " " THEN 1500 ; REM FIRE
1060 GOTO 1000
```

Well then, we can replace the GET statement by a subroutine which is called instead of the GET:

```
9000 POKE 37139,0 : POKE 37154,127 :
   REM SET UP DDRs
9010 J1 = PEEK(37137) : REM TEST VIA 1
9020 J2 = PEEK(37152) : REM TEST VIA 2
9030 JS = J1 or J2 : RETURN
```

then replace the tests on the value of A$ with tests on the value of JS:

```
1000 GOSUB 9000
1010 IF (JS AND 4) THEN 1100
1020 IF (JS AND 16) THEN 1200
1030 IF (JS AND 128) THEN 1300
1040 IF (JS AND 8) THEN 1400
1050 IF (JS AND 32) THEN 1500 :
   REM FIRE
1060 GOTO 1000
```

Next issue: potentiometer joysticks.

FIND

by Tim Duncan

My offering this month is a short machine code version of the "FIND" utility, similar to that provided on Vickit and the Programmers' Aid cartridge. This routine is most useful when writing and debugging programs.

When you type in the listing below and RUN it (don't forget to SAVE it first!) The program will poke a machine code routine into a safe area of memory ($02A1-$02FF) where it will stay until you switch off the machine. You can load other programs without affecting the routine.

To find a particular bit of Basic code or a particular string of characters in your program, all you have to do is write the expression you want found as the first line of your program; then type SYS 673 (RETURN). The routine will print out the line numbers of every line which contains that expression. If your first line was 'A = ', the routine would find lines such as A = 3 or A = A + 1, but would also find BA = 5 since this also contains "A = ".

To understand how the routine works, Suffice it to say that each line is stored in the following format:

LO	HI	LO	HI		∅
Link Address		Line Number		Basic Statements	End of Line

The link address points to the address where the next line starts. The link address and the line number take up two bytes each, so the Basic statements start with the fifth byte. We know when we have reached the end of the line when we find a zero byte, and we can find the beginning of the next line by using the link address.

Now let's see how the routine works. The first thing is to find where the program starts. This depends on how much memory you have added to your Vic, so we look at locations 43 and 44 to find out. Skipping the link address and line number, each byte of the line is compared in turn to the first byte of the expression in line 1. Since we know it's the first line of the program, the expression must start at the start of memory plus four bytes.

We continue comparing bytes until we find one that matches or until we come to the end of the line. If they match we must compare the next byte with the second byte of the expression — and so on. If they fail to match we go back to where we were and continue looking for a match with the first byte. If we reach the end of the expression we know we have found it, and print the line number.

When the routine finds the end of the line, it uses the link address to get the next line. A link address of zero means we have found the end of the program.

```
10 DATA 165,43,133,0,165,44,133,1,160,3,200
20 DATA 177,0,205,***,240,26,201,0,208,244
30 DATA 160,0,177,0,133,2,200,177,0,133,1
40 DATA 165,2,133,0,5,1,201,0,208,221,96
50 DATA 132,2,162,0,232,200,189,***,201,0
60 DATA 240,6,209,0,240,243,208,16,160,2
70 DATA 177,0,170,200,177,0,32,205,221,169
80 DATA 32,32,210,255,164,2,184,80,182,234
90 PRINT"■■ LOADING MACHINE CODE ■"
100 M=PEEK(43)+256*PEEK(44)+4:HI=INT(M/256):LO=M-256*HI
110 FORL=673TO757
120 READB$
130 IFB$="***"THENPOKEL,LO:L=L+1:POKEL,HI:GOTO150
140 POKEL,VAL(B$)
150 NEXTL
160 LIST10-80
```

COMING SOON

- **Tinymon on the Vic** — Richard Hunt's helpful implementation of Butterfield's monitor. Next issue, hopefully.
- **Programmers' Aids reviewed** — three packages from Commodore, Stack and Audiogenic.
- **Machine Code Monitors reviewed** — HESBAL, Dr Watson and Commodore's own MCM.
- **Games reviewed** — JD Collins gives his next 'punter's progress' page over to star-rated reviews.
- **Type 'n Talk** — review of speech input and voice output devices: win one in a brand new competition: a program for the blind.
- **Word processing on the Vic** — at last we've completed our review of all the WP packages we can find.
- **Beginners colour** — a run-down on Vic colour basics from Chris Preston.
- **RTTY and the Vic** — radio ham Mike Todd looks at the possibilities.
- **Beginning Assembler** — start of a major multi-part series.
- **The Complete Advanced Graphics** — amazing series from an extraordinarily young reader.
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Flyover

This one comes from A Millett of Softex, who has a vested interest in the form of the listing — it comes from the £50 Sinclair ZX printer via the interface that his company sells (end of sales plug: see the ad in this issue for more info!). The game itself is long and traditional, but it's a pretty good hi-res action game.

The ZX printer uses silver-coated paper and works electrostatically, which means in effect that the print head removes the silver to reveal the black underneath when it wants to create a character.

As for the listing, we had to reduce the original photographically to fit on the page; but here's a sample of the true size and actual width:

```
1650 SC=SC+(A-38)*5:T=T+1
1660 MS=MS-1
1670 POKEMP,0
1690 RETURN
1700 POKESW,0:POKES3,0
1705 IFMI>VDUTHEN1850
1710 A1=PEEK(MP):POKEMP,42
```

```
90 REM**************************
91 REM
92 REM FLYOVER (C) A.MILLETT
93 REM LISTED ON A ZX-PRINTER
94 REM USING THE SOFTEX
95 REM VIC/ZX PRINTERFACE
96 REM
98 REM**************************
100 POKE51,0:POKE52,28:POKE55,0:
POKE56,28:CLR
120 POKE36879,8
130 GOSUB7000
150 PRINT"■■DEFINING CHARCTERS"

160 FORX=0TO63:POKE7724+X+INT(X/
16)*6,X:NEXT
200 KK=25600:FORX=7168TO7679
210 POKEX,PEEK(KK+X)
220 NEXT
250 POKE36869,255:POKE36866,PEEK
(36866)OR128
300 GOSUB8000
980 POKE36869,240:POKE36866,150
985 GOSUB20000
990 END
7000 PRINT"■■VERIFYING DATA...."
7050 RESTORE:X=0
7060 READA$
7065 X=4095 AND(X+VAL(A$))
7070 IFVAL(A$)<>-99THEN7060
7100 IFX<>2829THENPRINT"■■TYPING
 ERROR IN DATA!":STOP
7400 RESTORE
7490 RETURN
8000 REM DATA-JX
8005 READX,X=7168+X*8
8007 IFX<7000THENRETURN
8010 READA$:IFLEN(A$)=8THEN8100
8015 IFLEFT$(A$,1)="="THEN8200
8020 POKEX,VAL(A$)
8030 FORY=1TO7
8040 READA:POKEX+Y,A
8050 NEXT
8060 GOTO8000
8100 GOSUB8910
8110 FORX=X+1TOX+6
8120 GOSUB8980:NEXT
8190 GOTO8000
8200 A=VAL(MID$(A$,2))*8+32768
8210 FORY=0TO7:POKEX+Y,PEEK(A+Y)
:NEXT
8290 GOTO8000
8900 READA$
8910 A=0:FORY=1TO8
8920 A=A*2-(MID$(A$,Y,1)="*"):NE
XT
8980 POKEX,A
8990 RETURN
10000 REM * HIRES
10050 DATA 0,102,60,24,60,60,60,
60,24
10100 DATA 27,0,128,128,128,192,
192,192,224
10110 DATA 28,224,224,240,244,24
8,254,255,255
10130 DATA 29,0,128,128,192,196,
228,238,254
10150 DATA 30,0,1,1,1,3,3,3,7
10170 DATA 31,7,7,15,47,111,127,
255,255
10200 DATA 33,0,1,1,3,35,39,119,
127
10220 DATA 34,255,255,255,255,25
5,255,255,255
10250 DATA 58,0,0,0,8,11,15,9,8
10260 DATA 59,0,0,124,255,255,19
3,224,127
10270 DATA 60,2,7,7,255,255,25
4,192
10300 DATA 61,64,224,224,224,255
,255,127,0
10310 DATA 62,0,0,62,255,255,131
,7,254
10320 DATA 63,0,0,0,16,208,240,1
44,16
10330 DATA 39,-81
10335 DATA 40,-87
10340 DATA 41,-90
10345 DATA 44,-35
10350 DATA 45,-86
10355 DATA 46,-102
10360 DATA 47,-83
10365 DATA 21,0,0,7,143,191,252,
158,135
10367 DATA 22,0,0,192,240,255,31
,15,252
10370 DATA 23,32,112,112,112,240
,240,224,0
10372 DATA 24,4,14,14,14,15,15,7
,0
10375 DATA 25,0,0,3,15,255,248,2
40,63
10377 DATA 26,0,0,224,241,253,63
,121,225
19990 DATA-99
20000 PRINT"■■FLYOVER BY A.MILL
ETT"
20520 PRINT"----------
-"
20550 PRINT"■USE THE SPACE BAR T
O"
20560 PRINT"■DROP BOMBS AT TARGE
TS"
20570 PRINT"■BELOW. A LIFE IS LO
ST"
20580 PRINT"■IF YOU BOMB THE CAN
YON"
20590 PRINT"WALLS. WHEN ALL THE"

20600 PRINT"■SPECIAL TARGETS ARE
"
20610 PRINT"■HIT, YOU PROGESS TO
 A"
20620 PRINT"■MORE ADVANCED SCREE
N!"
20640 PRINT"■■HIT SPACE TO CONT
INUE■"
20650 GETA$:IFA$<>" "THEN20650
20660 PRINT"■WARNING! FLYING OVE
R"
20670 PRINT"■WITHOUT DROPPING A"

20680 PRINT"■BOMB LOOSES A LIFE!
"
20700 PRINT"■TIPS:- THE HIGHER Y
OU"
20710 PRINT"■ARE FLYING, THE DEE
PER"
20720 PRINT"THE BOMBS PENETRATE.
"
20730 PRINT"■TRY TO HIT THE COLO
URED"
20740 PRINT"■■ TARGETS SIDE ON T
O"
20750 PRINT"■AVOID LEAVING SPECI
AL"
20760 PRINT"■TARGETS ISOLATED."
20800 PRINT"■■HIT SPACE TO CONT
INUE■"
20810 GETA$:IFA$<>" "THEN20810
20980 PRINT"■TURN VOLUME UP FOR"

20990 PRINT"■SOUND EFFECTS!"
21000 PRINT"■■ON COME & RUN"
21010 PRINT"■FLYOVER 2. GOOD LUC
K"
21090 RETURN
```

```
FLYOVER 2  BY A.MILLETT

100 REM FLYOVER(C)AM.
105 DIMA(2,2)
106 DIM M,X,Y,,,VDU,COL,SN,PL,PX
,PD,MP,MD,MI,MS,SC,T,MU,CD,VOL,S
1,S2,S3,SW
107 FORX=0TO2:READA(X,0),A(X,2):
NEXT
108 FORX=1TO7:READB(X):NEXT
110 POKE36864,9:POKE36866,154:PO
KE36867,166
120 POKE36869,255:POKE36866,PEEK
(36866)OR128
142 VDU=7680:COL=30720
143 VOL=36878:S1=VOL-4:S2=VOL-3:
S3=VOL-2:SW=VOL-1
145 SN=0:M=0:SC=0
150 GOSUB8000
160 PX=0:PD=-1:PL=7724:T=0
170 MP=0:MD=0:MI=0:MS=0:MU=0
200 GOSUB1000
210 GOSUB1500
220 POKEPX+PL,A(0,PD+1)-37
225 POKEPX+PL+PD,A(1,PD+1)-37
230 POKEPX+PL+PD+PD,A(2,PD+1)-37

250 IFT=B(SN)THEN150
490 IFM<4THEN200
500 POKE36879,46:FORX=1TO2000:NE
XT
900 POKE36864,12:POKE36866,150:P
OKE36867,174
910 POKE36879,8
920 POKE36869,240:POKE36866,150
940 IFSC>HITHENHI=SC
950 PRINT"■SCORE:"MID$(STR$(SC)
,2),",HIGH "MID$(STR$(HI),2)
960 PRINT"■ANOTHER GO ? (Y/N)"
970 GETA$:IFA$="Y"THEN110
980 IFA$<>"N"THEN970
990 END
1000 IF(PX)2ANDPD<0)OR(PX<23ANDP
D>0)THEN1100
1010 IFMUTHENGOSUB2100
1015 IFMP>VDUANDMI<VDUTHENPOKEMP
,32:MP=0:GOSUB2100
1020 POKEPL+PX,32:POKEPL+PX+PD,3
2:POKEPL+PX+PD+PD,32
1030 MU=1
1050 PL=VDU+INT(RND(1)*9+1)*26
1060 PD=ASC(MID$("22220020202000
20222202200200020",CD+1,1))-49
1065 CD=31ANDCD+1
1070 PX=0-(PD<0)*25
1100 POKEPL+PX,32
1105 IFMP>VDUANDMI<VDUTHENPOKES3
,250-MS*4
1110 PX=PX+PD
1120 POKEPX+PL,A(0,PD+1)
1130 POKEPX+PL+PD,A(1,PD+1)
1140 POKEPX+PL+PD+PD,A(2,PD+1)
1400 IFPEEK(197)<>32ORMP>VDUTHEN
RETURN
1450 MP=PL+PX+PD+26:MD=26+PD:MI=
0:MS=0:MU=0
1460 POKEVOL,8
1470 GOTO1600
1530 IFMP<VDUTHENPOKESW,150:FORI=
8TO95STEP-1:POKEVOL,I:NEXT:POKESW
,0:RETURN
1540 IFMI<VDUTHENPOKES3,248-MS*4
1520 POKEMP,32
1550 MP=MP+MD
1600 A=PEEK(MP)
1610 IFA=32THENMS=MS+1:POKEMP,0
RETURN
1620 IFA<39THEN1700
1625 IFMS<1THEN1850
1627 POKESW,128+RND(1)*100
1630 IFMI<VDUTHENMI=MP:MD=26:POK
ES3,0
1640 IFA>48THENSC=SC+A-48:GOTO16
60
1650 SC=SC+(A-38)*5:T=T+1
1660 MS=MS-1
1670 POKEMP,0
1690 RETURN
1700 POKESW,0:POKES3,0
1705 IFMI>VDUTHEN1850
1710 A1=PEEK(MP):POKEMP,42
1720 GOSUB2100
1750 POKEMP,A1:MP=0:RETURN
1850 X=MI-MD
1860 IFPEEK(X)>39THENX=X-MD:GOTO
1860
1870 FORY=MI-MDTOX+MDSTEP-26
1880 POKEY+MP-MI,PEEK(Y):POKEY,3
2:NEXT
1885 MP=0:GOSUB2000
1890 RETURN
2000 PRINT"■"SC"■ POINTS":RETURN

2100 M=M+1
2110 POKE8173,M+48
2120 FORX=1TO15
2125 POKESW,128+X*5:POKEVOL,15-X

2130 POKE36864,10:FORY=1TO30:NEX
T
2140 POKE36864,9:FORY=1TO30:NEXT

2150 NEXT
2160 POKESW,0
2190 RETURN
8900 SN=SN+1:POKESW,0:POKE36879,
14
8010 PRINT"■SCPEEN"SN:TAB(26),
8015 FORX=1TOSN:PRINTSPC(26)MID$
("*()*+,-",X,1)" IS"X*5"POINTS"S
PC(12-(X=1));:NEXT
8020 POKEVOL,6
8025 FORX=191TO255STEP32:FORY=12
8TOX:POKES3,Y:A=1.1:NEXT:NEXT
8030 POKES3,0
8040 PRINT"■"
8050 FORX=0TO6:FORY=VDU+286+X*26
TOY+25
8060 IFX<7-SNTHENPOKEY,49+X:GOTO
8080
8070 POKEY,ASC(MID$("-,+*)(",X+
1,1))
8080 POKEY+COL,3
8090 NEXT:NEXT
8100 A$="↑124←*[221**£22←***[20↑
****£20←*****[18↑******£06'J![↑J
06←*******J
8110 A$=A$+"'J!']'***£←*J!']'J'***
*
8120 X=7965
8130 IFA$=""THEN8200
8140 IFVAL(A$)THENX=X+VAL(A$):A$
=MID$(A$,3):GOTO8130
8150 A=ASC(A$):A$=MID$(A$,2)
8160 IFA=42THENA=34
8170 IFA>64THENA=A-64
8180 POKEX,A:POKEX+COL,5
8190 X=X+1:GOTO8130
8200 FORX=1TO9:FORY=VDU+COL+X*2+
TOY+25
8210 POKEY,VAL(MID$("443355771"
,X,1))
8220 NEXT:NEXT
8300 GOSUB2000:POKE8173,M+48
8490 RETURN
9500 DATA 60,61,59,62,58,63
9500 DATA12,30,50,70,92,114,138
```

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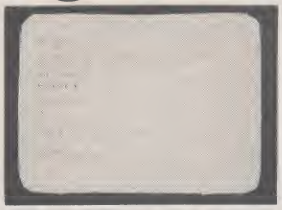

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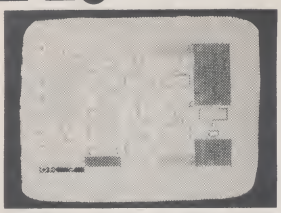

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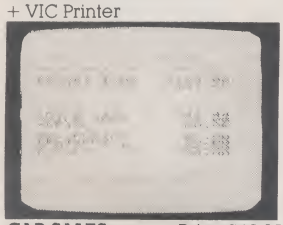

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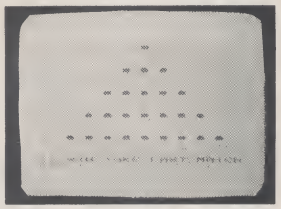

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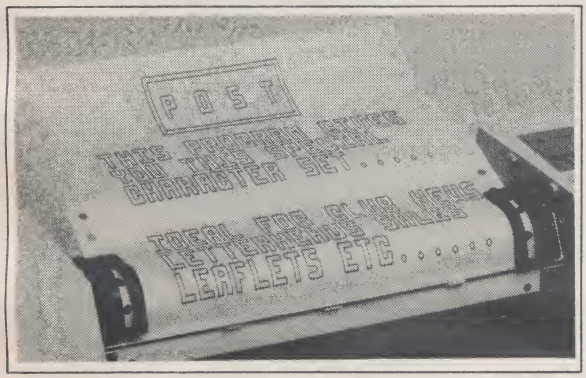

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BEGINNERS

A Punter's Progress: Episode Three

by J D Collins

Hello Comrades. I want to start by correcting a couple of comments I made in my last epistle. I speak of the games ROX from DK'tronics, Vic Gammon from Bug Byte and Space Storm from Rabbit Software.

I finally cracked the colour problem in **ROX** and got it to play on a light purple backgound: and all was revealed! It's not the most thrilling game action-wise but it was fairly challenging.

I also learned how to play Vic Gammon and heartily recommend it — but more about that later.

My congratulations to Rabbit Software on **Space Storm**; I had a really pleasant chat with one of their staff on the phone about the loading problem, he was most helpful and sent me a loadable program by return of post. Space Storm is the best thing I've seen so far; at first I thought the graphics were good but the pace a bit slow — then it speeded up on me and Pow! Excellente!

If you are starting out in computing from the ground up like me, but have not got a Vic 20 yet, maybe I can offer a preliminary word. When you buy your Vic get at least one games program to keep your spirits up (not withstanding my comments on program quality). And get the Commodore joystick too — it is useful, cheap and robust, and it works! I'd also advise you to take a vow of abstinence on your social life and work through the Commodore **Introduction to BASIC Part 1** before doing anything else. I wish I had.

Lastly, if you can, do it with a friend. Then you will have both a shoulder to cry on and someone to share your triumphs. I feel really good when I get the hang of something and want to say "look what I've done!"

Oh, and don't forget to take out a subscription to **Vic Computing;** the programs alone will be worth it and all that TechnoBabble will make sense eventually. Then you too can show off at parties!

I am still working through the **Introduction to BASIC** in between entering more games programs from various magazines. I may not become a proper programmer; but it is surprisingly satisfying to have entered a program and got it working, maybe adding a few extra bits like easier instructions, a change of sound effect, a simple flashing "you crashed" message somewhere else.

One odd thing: I keep having trouble with programs that have DATA statements in them. Somehow my Vic reads one less data item than is listed. Yes, I checked that the number of data items corresponds to the number of items to be read. The only answer I have come up with so far is to add a zero data item to the end of the last line of data items. Anyone got any idea where I am going wrong?

Another problem I would like to solve is the One Armed Bandit program in **Vic Computing** April 82. The 'HOLD' option only works on the third box, and the third box also has part of its frame missing. I have pored over the listing for hours: but as I don't understand the details of the program, nor the overall structure I cannot see where the fault lies. I would also like to add tumbling dice and jackpot sound efects but cannot work out how to do it even with my extra 3K memory. I suspect that to add sound I would have to juggle with those mysterious memory locations that I don't understand as yet. Shame about that, it is quite a good game otherwise.

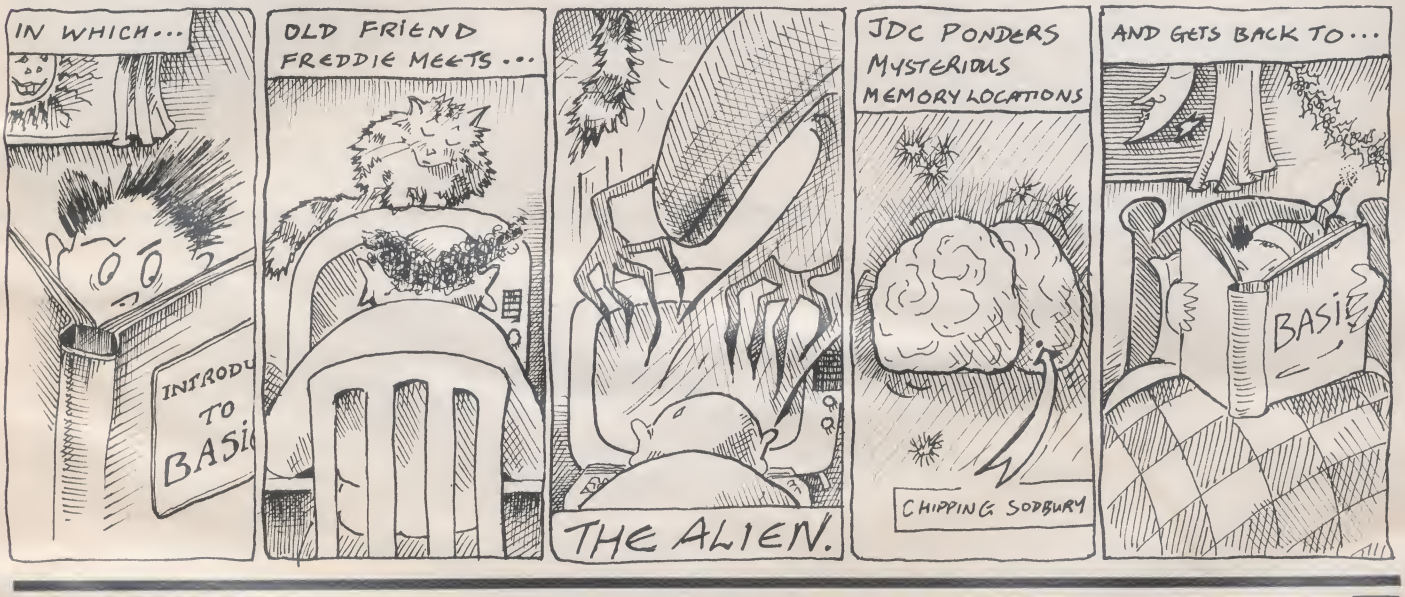
I have recently had my Vic 'touch-tested' by family and friends, and it was interesting to see how they got on. My brother, sister-in-law and nine-year-old nephew Andrew came to stay recently and I thought it would be a good chance to see how Andrew got on with a Micro-Computer. At first I had to load and run all the games for him and help out with the controls. I think it was his first sight of a keyboard, especially one that was not his, but that did not last long.

I think I made it all more complicated than it need have been by teaching Andrew to load programs by name instead of just the simple LOAD command, there being only one game per tape; but the keyboard practice probably came in useful later on. By mid-week Andrew had enough skill to load, run and reload programs on his own, only calling for help when the 3K memory expansion had to be added or removed. By that time my brother had muscled in on the act and Andrew was faced with competion!

My sister in law was not at all interested. I wondered if this was all part of the boys versus girls thing we have in our culture, but that is a can of worms I won't open up here.

Two things struck me about Andrew's handling of the Vic. First he had a lot of trouble remembering to use the Return key; maybe Andrew just needed time to settle down with the thing. Or maybe it should have a new name like 'Command' or something.

...page 38



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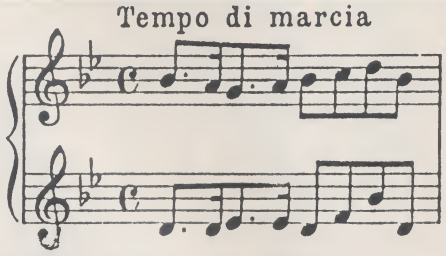

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Mods

Extending the Arfon Expander

by Chris Durham

The Arfon expansion unit is a popular method of plugging up to seven cartridges into the Vic simultaneously. Unfortunately there is no way to switch off any unwanted cartridges. And 'clashing' cartridges, two or more which use the same area of memory, cannot be plugged in at the same time: this means a lot of cartridge changing with resultant wear on the connectors.

Also, because of the change of memory locations, programs written for the unexpanded Vic will not run when more than an extra 3K RAM is plugged in.

The following modification allows all seven sockets to be used by any combination of cartridges, selection being made by a small switch bank at the rear of the expansion unit PCB. Total cost of the modification is about £3 and the job takes approximately 45 minutes.

The theory is quite simple. If you remove the +5v power from a cartridge it ceases to exist as far as the operating system of the Vic is concerned. By switching the power connection to each socket individually you can make the Vic see only those cartridges you have selected.

The Actual Work

Before carrying out the modification ensure that the mains plug is removed from the socket. Start by removing the Vic from the expansion unit and then undo the six bolts holding the PCB in place, making sure that you do not lose the nuts and locking washers beneath the unit. Turn the board over and find the main +5v supply line on the printed circuit (see fig. 1). Decide how many sockets you wish to be able to switch out (six are shown in the diagrams here) and cut the printed circuits where indicated, using a sharp modelling knife. The supply line for socket No. 1 is situated on the top of the PCB as shown in fig. 2. To ensure a good break make two cuts approximately 1mm apart and remove the copper in between.

Cut the veroboard to size and mount on the underside of the PCB as follows: drill two 3mm holes approximately 5mm apart and 7mm from the edge as shown in fig. 2. Make up some five-minute epoxy resin glue and coat the top half of the veroboard as indicated in fig. 3A. Fix the veroboard to the underside of the PCB ensuring a good 'key' through the two holes. Make sure that the glue does not spread too far along the copper strips underneath the veroboard or block any holes outside the glued area.

After the veroboard is firmly glued, solder the wire connections between the veroboard and the pins as shown in fig. 3B. Use single-core wire and route cables neatly along the board, sticking down with a small spot of superglue. When soldering the wire to the pins, ensure a good physical connection by wrapping the wire around the pin before applying the soldering iron. Where the wire joins the veroboard from underneath, fit the wires as shown in fig. 3C to ensure a good connection.

When all the wires are connected, fit the wire links across the veroboard (fig. 3A) together with the connection to the 5v power supply (red cable on the PCB). Now fit the switch bank onto the veroboard and solder the pins. Alternatively, a socket can be soldered to the veroboard and the switch bank can be mounted on the socket. If you use the latter method then ensure that you firmly support the veroboard from underneath when you fit the switch into the socket.

Testing

If you have a test-meter you should now check that with all switches in the 'off' position there is no connection between the pins marked A-F and the 5v power supply cable. Then test that a connection exists for each socket when the relevant switch is moved to the 'on' position.

Once you are satisfied that the wiring is correct and that there are no solder 'bridges' between tracks, re-mount the PCB with the six bolts: remember to replace the plastic spacers and the locking washers.

Finally, refit the Vic — you may have to adjust the position of the PCB slightly to ensure a correct fit. Once the Vic is installed, turn on the power and ensure that the Vic functions correctly. Turn the power off again and fit all your cartridges. Select either a games cartridge or a particular combination of memory and switch on. The Vic should respond as if only the selected cartridges are plugged in. If you have left any sockets permanently connected then these should only be used for cartridges such as the Machine Code Monitor or the Programmers' Aid, which require a SYS command to activate them, on the IEEE 488 interface.

FIG 1

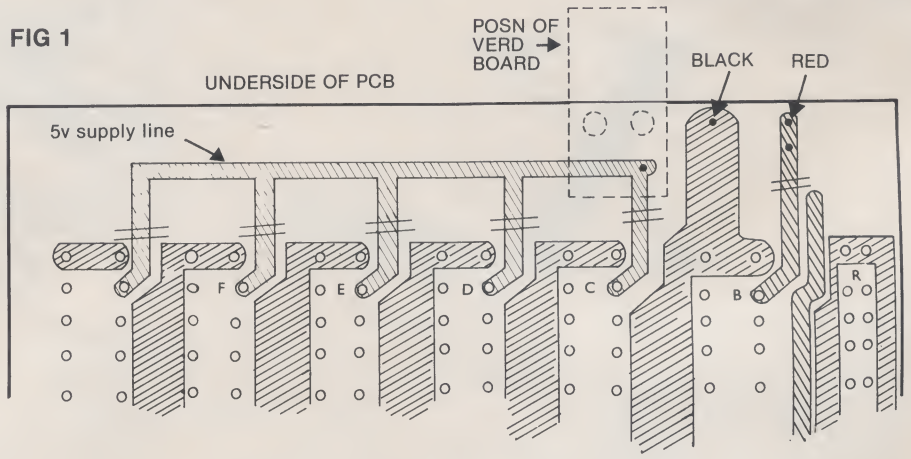
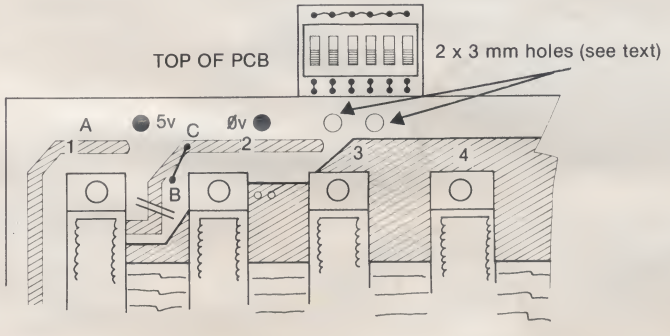


FIG 2



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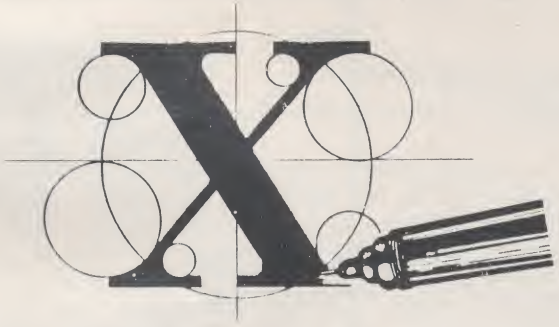

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An introduction to user-defined graphics

by Trevor Pitts

It is possible to have characters of your own design accessible via the keyboard on the Vic 20. This means you can have alien spaceships or little men running around the screen at your command.

First, some explanation of the character ROM. The 4K character generator ROM resides between locations 32768 and 36863 and is split as follows:

32768-33791 . . . upper case and graphics
33792-34815 . . . reverse upper case and graphics
34816-35839 . . . upper and lower case
35840-36863 . . . reverse upper and lower case

Control Register No 6 (location 36869) normally points to the lower 2K of the character generator ROM; but by pressing the shift and Commodore logo keys together, lower-case characters are displayed. All that has happened is that Control Register No 6 has increased in value pointing 2K further up in memory. The value held in Control Register No 6 has moved from 240 to 242.

The character generator, or any part of it, can be moved into RAM at any of locations 4096, 5120, 6144 and 7168.

By moving the character generator user-definable characters can be added to it.

Your first task must therefore be to set aside enough RAM to store the character generator. If we wish to have the lower 2K character genrator in RAM, we must allocate 2K of RAM in which to store it. On the unexpanded Vic the user Basic is between locations 4096 and 7679; so to save 2K of RAM using the start locations shown above, the only available start address is 5120.

By starting the character generator at this address, then, there is the 2K required — but we will take the second 1K for our user-defined characters. It will be necessary to prevent the character generator from being overwritten, so the top-of-memory pointers must be altered.

One major problem is that by taking 2.5K of the available 3.5K of user RAM you will only leave 1K for your program, which isn't much. There are ways around this, however, and I will expand on that later.

First Steps

Each character is made up of 8x8 matrix — an example of the standard keyboard character A is shown in figure 1.

For your own characters, you must first have a design. The easiest way to do this is to draw the shape on paper with an 8x8 grid on it (see figure 1 again). The numbers across the top of the matrix in figure 2 are what concern us, and they run from right to left in normal binary numbering — that is, the first number is 1 and each successive number is double that of the last up to 128. In figure 2 I have shown a "space invader" character with the eight number totals that make up this shape.

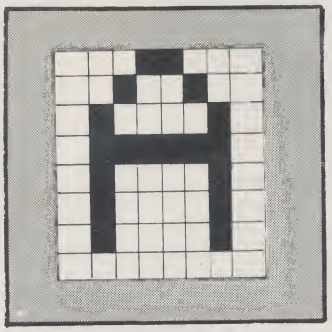

Figure 1

Once you have designed your character you take the eight horizontal lines separately and add the values above each of the filled squares to give a total for that line. If the square is empty, ignore the value at the top of it. Start a new total when you have finished each line. You should end up with eight line totals for each character. (If a line has no filled-in squares, its total is zero and this must be included as one of your eight totals).

These totals are then put into a DATA statement, as in this program to move the character generator to RAM and include the user defined-character in figure 2:

```
10 POKE 51,255: POKE 52,19:
   POKE 55,255: POKE 56,19
20 FOR I = 0 TO 1023
30 POKE 5120 + I,
   PEEK(32768 + I): NEXT
40 FOR I = 0 TO 1023: READ A
50 IF A = 999 THEN 500
60 POKE 6144 + I, A: NEXT
70 DATA
   24,60,102,231,255,36,66,36
80 DATA 999
500 POKE 36869,253
```

Line 10 moves the top of memory pointers and the string pointers.

Lines 20-30 move the lower 2K of the character ROM into RAM starting at location 5120.

Lines 40-60 read the DATA statements and POKEs each into locations 6144 on; these statements contain your characters (in this case, only one character).

Line 50 allows you to jump out of the loop when all the characters have been read, therefore allowing you to add more characters when you like without altering the program.

Line 80 is a dummy DATA statement to mark the end of the user-defined character data: its value is used in Line 50.

Line 500 moves the character generator pointer (Control Register No 6) to point to location 5120.

When this program is run you can use all the characters on the keyboard as usual — except that the Reverse On characters are not now available. Now when you press the Reverse On key and then type @ the 'space invader' will appear. Similarly if you want to POKE this character to the screen, you must use the POKE value of Reverse On @ (which is 128).

Remember that you must either poke a colour into the colour RAM or change the screen colour from white; otherwise the POKEd character will be invisible.

More memory

So now you have your own characters, but with only 1K left for your programs. The program we have just used allows for 128 user-defined characters, and incidently wastes 0.5K of RAM inbetween the end of the character generator and the start of screen RAM at location 7680; but do you need 128 new characters?

In most games you will never need that many. So by making the following alterations to the program we can get 64 user-defined characters and leave 2K

POKE Val	Char	POKE Val	Char	POKE Val	Char
0	@	22	V	44	'
1	A	23	W	45	-
2	B	24	X	46	•
3	C	25	Y	47	/
4	D	26	Z	48	0
5	E	27	[	49	1
6	F	28	\	50	2
7	G	29	]	51	3
8	H	30	↑	52	4
9	I	31	←	53	5
10	J	32	space	54	6
11	K	33	!	55	7
12	L	34	"	56	8
13	M	35	#	57	9
14	N	36	$	58	:
15	O	37	%	59	;
16	P	38	&	60	<
17	Q	39	'	61	=
18	R	40	(	62	>
19	S	41	)	63	?
20	T	42	*		
21	U	43	+		

Figure 3

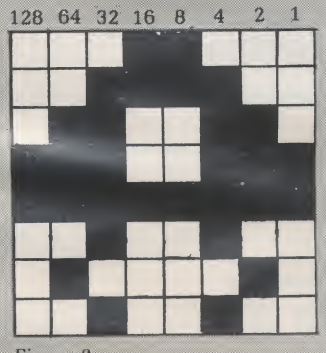

Figure 2

Graphics

of RAM free for user programs:

1. Alter Line 10 to POKE 51,255: POKE 52,27: POKE 55,255: POKE 56,23
2. Alter Line 30 to POKE 6144 + I, PEEK(32768 + I): NEXT
3. Alter Line 40 to FOR I = 0 TO 511: READ A
4. Alter Line 60 to POKE 7168 + I, A
5. Alter Line 500 to POKE 36869,254

The same rules for printing and poking the characters apply as before.

It is also possible to move the character generator a further 1K up in RAM. There are only 512 bytes available here, though, so this means we can have no more than 64 characters in total. If you look at figure 3 you will see that this will allow you all of the upper-case letters and all of the numbers plus various punctuation characters (POKE values 0-63): in fact all that we have lost are the block graphics.

In many games, very few characters are required — perhaps five or six different aliens, a starship, and asterisks and full stops as asteroids. We could therefore put our newly-defined characters in the character generator to replace any that we do not want — for instance, = , + ,(,%.

To do this the following alterations to our main program are necessary:

1. Alter Line 10 to POKE 51,255: POKE 52,27: POKE 55,255: POKE 56,27
2. Alter Line 20 to FOR I = 0 TO 511
3. Alter Line 30 to POKE 7168 + I(PEEK 32768 + I): NEXT
4. Alter Line 40 to FOR I 0 TO 7: READ A
5. Alter Line 50 to POKE 7168 + I + (n*8),A: NEXT
6. Delete Line 60
7. Alter Line 500 to POKE 36869,255

. . . Where *n* in line 50 is the poke value of the character that you are replacing. So if you replace the equals sign with the 'space invader', line 50 would read:

POKE 7168 + I + (61*8),A: NEXT

You should be able to find enough 'spare' characters from those shown in figure 3 to replace them with quite a few of your own. Each character can be put in separately, as above: but if you find a whole block of them that

you wish to replace (poke values 33 to 41, for instance), just change line 40 to read:

FOR I = 0 TO (*m*8-1)

. . . where *m* is the number of characters you are replacing. Using our example of the characters 33 to 41 inclusive, Line 40 would become:

FOR I = 0 TO (9*8-1): READ A

But remember you must have nine DATA statements each consisting of eight figures, one DATA statement for each character.

Carry on keying

There are many variations on this theme that you can try. Perhaps you may require normal and Reverse On characters but not block graphics in your character generator. To do this just load into RAM the parts of the ROM generator you require. Try this:

1. Alter Line 20 to FOR I = 0 TO 511
2. Alter Line 30 to POKE 5120 + I, PEEK(32768 + I): NEXT
3. Add a new line 34: FOR I = 0 TO 511
4. Add a new line 36: POKE 5632 + I, PEEK(33792 + I): NEXT

You will find that you now have ordinary upper-case letters, or Reverse On upper-case letters with the shift key pressed.

So try a little experimenting: games really come to life when you use your own characters.

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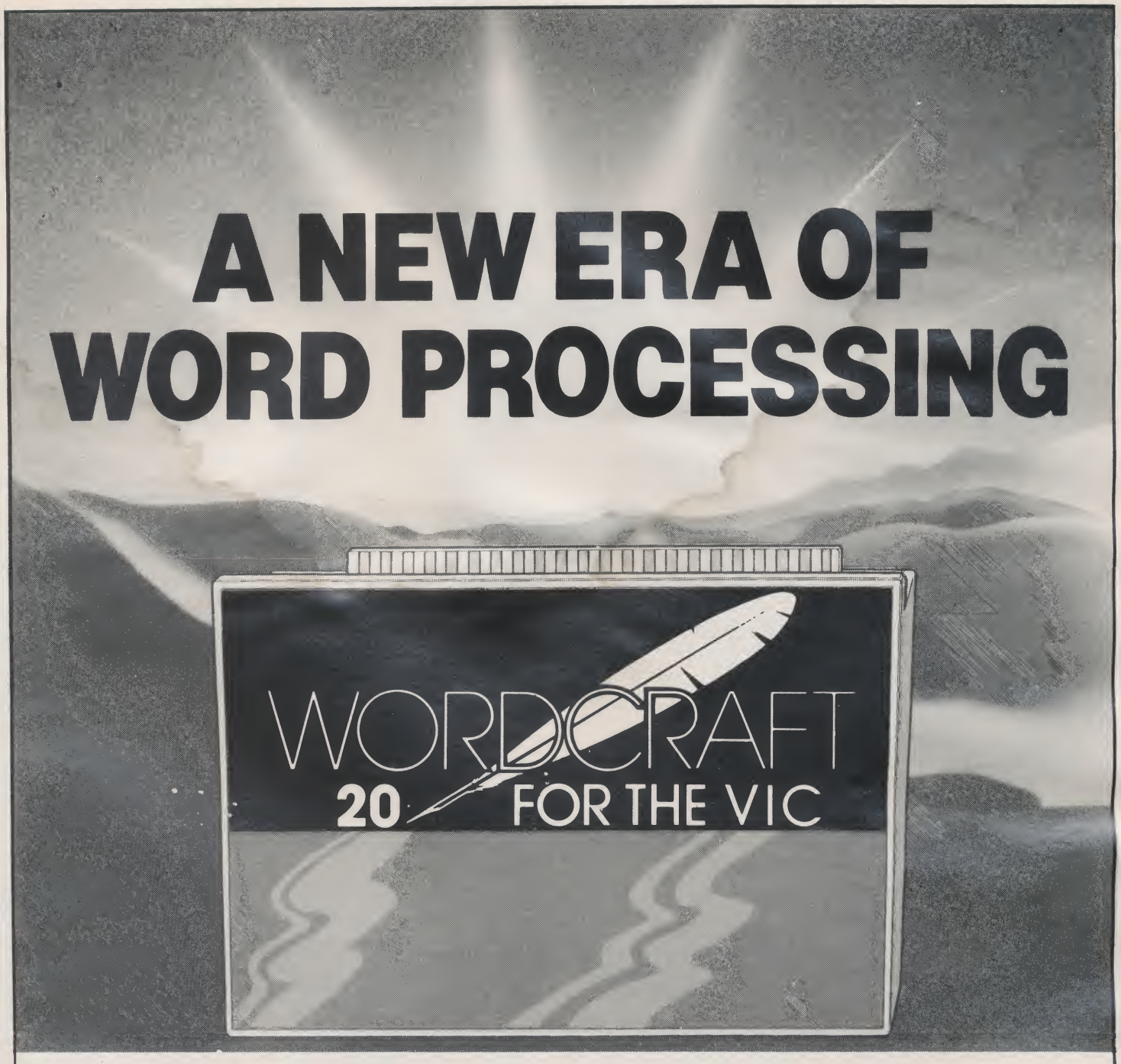

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The compleat software catalogue — part Two

There's a lot of software for the Vic, so we've had to split this Catalogue alphabetically by name of supplier over two issues. Part One appeared in October.

Prices include VAT and p&p except where noted. Most of the programs are available from Vic dealers or by mail order, and most are cassettes that run on the unexpanded Vic. You can assume that's the case unless the text says it isn't. Some we have reviewed and/or bought, so in a few cases the descriptions also include a comment from us. We are however preparing a fuller review with star rating of all the games and business packages we can get hold of.

Each entry here is coded by use into one or more categories, as follows:

- [G] **games**
- [B] **business**
- [E] **education and school**
- [H] **home**
- [P] **programming tools**

Honeyfold Software
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Complete Assembler Course: Comprises a 200-page paperback containing a complete self-paced instruction course on the 6502 instruction set (book available separately at £10) and a cassette or disk with four programs — assembler for unexpanded Vic and for 3K expansion, a BIN/BCD/Hex tutor (shows the interrelationship between the binary, decimal and hex number bases, and also demonstrates operation of the 6502 carry flag), and a set of BIN/BCD/Hex exercises. Price for book and software is £15 on cassette, £17 for a disk. [P]

TOTL TEXT: Good-looking word processor. Price £16.95 [H]

TOTL LABEL: Mailing list and label print program. Price £14.95 [H]

TOTL TIME: Time use program — output in various formats organised by person, project or activity. Price £16.95 [B]

Research Assistant: Compile and organise information — with reference to it by keyword. Price £16.95 [H]

Bouncing Games: Four levels of skill for six ball games. Price £9.95 [G]

Peter V Hunt
62 Copythorne Road
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Devon TQ5 8PU

Hangman: The old favourite. Three programs on the tape each with 50 words. Mail order only. Price £4. [G]

Beetle Drive: Another standard — roll a dice to create the shape. Mail order only. Price £4. [G]

Word Perfect: A word test — you choose the nearest meaning to the word Vic gives you. Three programs on the tape each with 30 tests and 90 possible answers. Mail order only. Price £4. [G]

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Kayde Valley: "The ultimate in adventure games". Price £7.95 [G]

Othello: Traditional Japanese board game. Price £7.95 [G]

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Stock Control: Reviewed pretty favourably by us two issues ago. Handles 110 items with 8K expansion, 300 with 16K; gives total inventory value, stock list, and stock-low items. Price £28.75. [B]

Address Book: Also reviewed. Handles 50 name-and-address records with 8K expansion, 130 with 16K; gives search, list, amend, and print options including labels. Price £28.75. [H]

Leisuronics
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Blackpool
Lancs FY1 1NH

All these need 8K expansion. Add 50p for P&P.

Golden Baton: Venture into a strange province of danger and evil magic to retrieve the stolen Baton of King Ferrenuil (who he?). Price £9.95 [G]

Time Machine: As a newspaper reporter you have been sent to the old house on the moors to investigate the eccentric Dr Potter . . . price £9.95 [G]

Arrow of Death: Find and destroy the source of the evil blight which has befallen your homelands. Price £9.95 [G]

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The Green
Tadley
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Hampshire

All these are mail-order only — add 50p to the total order for p&p.

Graphics/Character Creator: Define lots of your own shapes. Price £8. [P]

Utility Program: A useful-looking parcel of a limited editor for games graphics and Softkey, a way of assigning Basic commands to function keys. Price £6. [P]

Breakout and Deflex: One speaks for itself, we know nothing about the other game here. Price only £3.95 though. [G]

Defenda: Full-feature version of the 'invaders' arcade game. Needs 8K expansion. Price £10. [G]

Ratman: Zap the rats with your hammer as they fall from the sky and before they mutate. Needs 8K expansion. Price £8.95. [G]

Blitzkrieg: Originally 'Bomb Buenos Aires' — fly your Vulcan bomber past the flak and raze the city. Price £4.95. [G]

Traxx: Version of the arcade game 'Amidar' and with echoes of 'Pacman'. We've seen this one and it looks very good — fast, colourful, fun. Needs 8K expansion. Price £10. [G]

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Three cassettes containing some of the programs in Clifford Ramshaw's **Vic Innovative Computing** book.

Vic Innovative Computing 1: Seven ok games — 'dumper' is a neat one, so is 'nuclear attack'. Price £5.95 [G]

Vic Innovative Computing 2: Seven more games. Price £5.95 [G]

Vic Innovative Computing 3: Seven more games. Price £5.95 [G]

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Rogue Elephant: Version of 'Rhino' with six skill levels. Mail order only. Price £4.99. [G]

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Music Tutor 2: Extended version that requires 16K expansion. Mail order only. Price £8.99. [H]

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Diggles Wine Cellar: Questions you and then suggests a wine for the occasion. Needs 16K expansion. Mail order only. Price £4.99. [H]

Diggles Kitchen: Three separate volumes of tried and tested recipes — worldwide cookery, European, and "everyday family meals". All need 16K expansion. Mail order only. Price £4.99 a piece, two for £9. [H]

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Spellings: Master tape allows you to create and score spelling tests of increasing difficulty. Mail order only. Price £5.50. [E]

Maths Tester: Five grades of kids' arithmetic tests. Mail order only. Price £5.50. [E]

British Isles Geography: Master tape keeps score, displays a map of Britain and asks questions about towns. Price £9.50. Follow-up data tapes (£3.39 each) add questions on counties and ports, industries and physical features, places of interest etc. Mail order only. [E]

Space Hero: Adventure game, needs 16K expansion. Mail order only. Price £9.95. [G]

Quest: Adventure game, needs 16K expansion. Mail order only. Price £9.95. [G]

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Sorry but we have no further information on these. Mail order only Add £2.50 p&p to total order if you're spending less than £100.

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Mailing List: price £19.95. [H]
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Credit Sales: price £19.95. [B]
Cash Sales: price £19.95. [B]
Credit Purchases: price £19.95 [B]

Morris Associates
37 Catherines Road
Baglan
Port Talbot
West Glamorgan SA12 8AT

Puckman: Sound familiar? A gobbler game with keyboard or joystick control. Mail order only. Price £6.50. G

Dive Bomber: Pilot your (damaged) plane, drop the bombs, clear the high buildings and land — and it gets more difficult as you go on. Mail order only. Price £4.95. G

Space Travel: Zap the space birds (?) and avoid the bombs — and when you've gone 3,000 km it gets more difficult. Mail order only. Price £4.95. G

Scram: Defend your bit of space against the invaders, avoid hitting the (moving) ground contours, by using keyboard or joystick. Mail order only. Price £4.95. G

Balloon: Use an air pump to blow a balloon through a gap in a wall full of sharp flints. Price £5.50. G

Wheel of Fortune: Gambling game that needs 3K expansion. Price £4.95. G

Dice: Explicitly named game. Price £5.50. G

They're Off: Horse-racing game. Price £5.50. G

Cosmic Blaster: Zap the aliens, avoid the missiles. Price £5.50. G

Boxing: You're Rocky, Vic is the champ. Price £4.95. G

Alien Blaster: Well, the um object is to er blast the ah aliens (we think). Price £5.50. G

Moonlander: Vic version of the classic game that juggles velocity, fuel and distance. Price £5.50. G

Booby Trap: Save injured buddies from minefield: "great fun", it says here. Price £5.50. G

Surround: Box the computer in before it does that to you. Price £5.50. G

Mr Micro
PO Box 24
Swinton
Manchester M27 3AL

Gold Rush: Remember the bejewelled rabbit 'buried somewhere in Britain'? Here's one microcomputer equivalent. Real cash to the winner! Price £16. G

Great Balloon Race: Graphics game for keyboard or joystick. Price £16. G

Mysterious Island: Recommended multi-tape adventure game for keyboard or joystick — needs 16K expansion though. Price £16. G

VIGIL: A 'Video Interactive Games Interpreter Language' — in other words, a programming language with over 60 commands specifically devised for writing games. The tape includes nine sample games as well. We haven't tested it, but secondhand reports are good. Supports input from joystick, paddles, and lightpen as well as keyboard; needs at least 3K expansion. Price £25. P

Graphvics: Cassette alternative to plug-in graphics cartridges, a utility which adds 18 commands for hi-res multi-colour graphics (152x60 points). Supports input from joystick, paddles, and lightpen as well as keyboard; needs 3K expansion. Price £18.50. P

Hi-Res and Multi-colour: Slimmed-down version of Graphvics for unexpanded Vic — 104x152 points. Price £15.75. P

Piper: Music composer with sample programs. Price £18.50 H

Muvic: Converts Vic into a pretty full sound synthesiser — define waveform, ASDR envelope, etc. Price £15.75. H

Vic Value No 1: Keyboard or joystick control on four games programs — Helicopter Lander, Dragon, Alien Pilot, Hunter. Price £7.95. G

Tiny Pilot: easy-to-learn computer-aided-instruction language. Good for kids. Price about £18.50. E

Budgeteer: Plan your personal expenditure. Price about £18.50 H

Tiny Basic: You really **want** a cut-down version of Basic? Price about £18.50 G

Joystick Painter: Requires expansion (and a joystick) to 'draw' colours. Price about £15 G

Super Expander Screen Dump: Copies displays in various magnifications — sounds great. Obviously needs the Super Expander. Price about £15. P

Rayflection and Micromind: One game involves firing out rays to find the atoms, the other is a variant of 'Mastermind'. Price £5.95. G

Alphasquare and Switchback: One is a pattern recognition game, the other is a 'switch and match' puzzle. Price £5.95. G

Brainbox: Four 'educational' programs — Blaster Maths, UK Quiz, Math Machine, Spell-a-gram. Price £5.95. E

Star Stream and Snake Trap: One game has you avoiding the stars to land, the other guides the snake into the pit. Price £5.95. G

Upset Me Not and Vic Boxes: One is described as "weird roulette game", the other is a classic two-player boxes game. Price £5.95 G

Laseroids and Beserk: 'Invaders' style arcade game plus a 'zap the robots' mission. Price £5.95. G

Victhello and Subaqua: A version of 'Othello' and an underwater game. Need 3K expansion. Price £5.95. G

Rainbow Passage and Pot Shot: First is a you-vs-Vic board game, second is a reaction game. Price £4.95. G

Flyer: Fast reaction game. Price £5.95. G

Protect: Prevent your base from being attacked by nasties. Price £5.95. G

Flash: Fast two-player game. Price £5.95. G

Astro-command: Protect your city from the aliens (again). Price £5.95. G

Damsel: Two to four players rescue the maiden. Yuk. Price £5.95. G

Vic Trek: Boldly go where several dozen other people have gone before. Price £5.95. G

Jupiter Lander: Spaceship lander game. Price £5.95. G

Yahtzee: "Computer classic game" says Mr Micro, somewhat unforgivingly. Price £5.95. G

Mastervic: 'Mastermind' style code game. Price £5.95. G

Etch-a-Vic: Clever if limited tool for drawing on the screen and saving the results. Recommended. Price £5.95. G

Vic Nab: Outrun the Vic's blob as it chases you around a maze. Price £5.95. G

Nab Plus: ...and again, with extras. Price £5.95. G

Vico: 'Simon' type sound sequence game. Price £5.95. G

Vic-Tac-Toe: Noughts and crosses. Price £5.95. G

VLIP: Chase and catch numbers. Keyboard or joystick. Price £5.95. G

Beast Catch: Move walls, catch monsters. Keyboard or joystick. Price £5.95. G

Breakaway and Breakout: Classic arcade games. Price £5.95. G

Metric Conversion: Explicit title for both-ways conversion. Price £5.95. G

Alphabet: Letter teacher for kids. Price £5.95. G

Multiply: Kids tutor. Price £5.95. E

Horse Division: Correct results move the gee-gees. Price £5.95. E

Addition: Teaches basic sums. Price £5.95. E

Maths Test: Varied questions with scoring. Price £5.95. E

Maths Invaders: Answer before the nasties land. Price £5.95. E

VGEN: Define up to 64 of your own screen characters. Price £5.95. P

Northern Ireland Computer Centre
4 High Street
Holywood
Northern Ireland

Vicstock: Inventory control for up to 100 stock lines; reports on current stock position and re-order requirements. Needs at least 16K expansion; tape or disk formats. Mail order only. Price varies between £60 and £88. B

Opus Z Software
525-531 London Road
Westcliff-on-Sea
Essex

Bugbasher: Endless green meanies, rotating maze, five levels of play. Price £3.00. G

Bomber Run: Blast out the enemy defences and fighter planes to capture the base. Price £3.00. G

Encounter: crack the lights and music code to land the giant spaceship. Price £3.00. G

Vicpendium 1: Four games — invaders, hangman with numbers, Othello, Gorgon's Tomb (grab swag before serpent strikes). Price £4.20. G

Pedro Computer Services
4 Cowcross Street
London EC1

Cyber Men: Fast machine-code game scoring points by eliminating and/or dodging the androids. Mail order or from the retail shop. Price £7 plus £1.75 p&p. G

Vic Defender: Fast version of the arcade game — fly low, avoid missiles, zap the enemy ship. Mail order or from the retail shop. Price £7 plus £1.75 p&p. G

Big Four: Meteorites (blast your way out of the meteor shower), Minefield (try to keep with your fast-moving mine detector!), Hunter (zap sheep, avoid the holes), and Lander (moonlander game). Mail order or from the retail shop. Price £5 plus £1.75 p&p. G

Star Trek: Zip around the universe eliminating Klingons with plasma bolts and lasers. Needs at least 3K expansion. Mail order or from the retail shop. Price £5 plus £1.75 p&p. G

Data Base: Define up to seven fields per record. Needs 8K expansion. Mail order or from the retail shop. Price £7 plus £1.75 p&p. B

Hi-res Character Generator: Easy editing to create your own characters and shapes. Needs 8K expansion. Mail order or from the retail shop. Price £7 plus £1.75 p&p. P

Tiny Pilot: easy-to-learn computer-aided-instruction language. Good for kids. Price about £18.50 E

Budgeteer: Plan your personal expenditure. Price about £18.50 H

Graphvics: Hi-res (152x160 points) and multicolour (76x80) from 18 new commands. Price about £18.50. P

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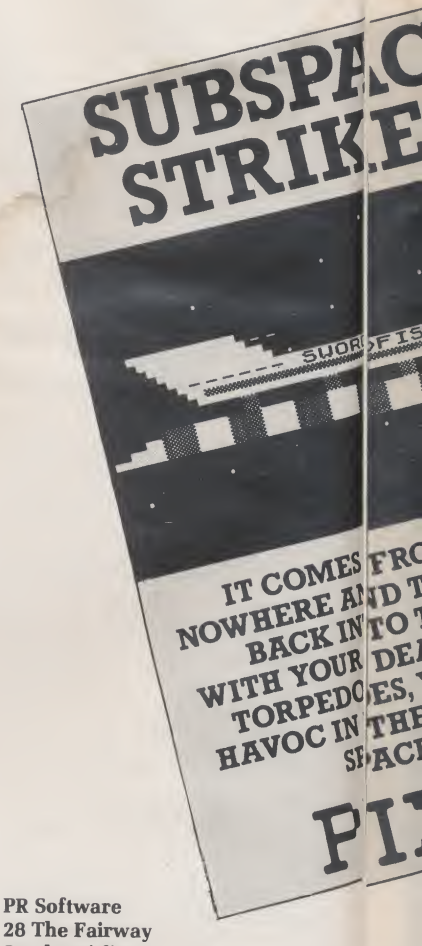
Catalogue

Hires/Multicolour: Slimmed-down version. Price about £15. P
Vigil: Write-your-own-games language. Price about £25. P
Piper: Music composer. Price about £18.50. H
Tiny Basic: You really **want** a cut-down version of Basic? Price about £18.50. G
Joystick Painter: Requires expansion (and a joystick) to 'draw' colours. Price about £15 G
Super Expander Screen Dump: Copies displays in various magnifications — sounds great. Obviously needs the Super Expander. Price about £15. P

Personal Computer Palace
4-6 Castle Street
Reading
Berks
Add 50p P&P per order.
Headbanger: Grab cash, avoid raining hammers, embrace revivifying aspirin. Sounds great! Price £9.95. G
Rox: Blash incoming boulders. Price £5.95. G
3D Maze: Price £4.95. G

Pixel Productions
39 Ripley Gardens
London SW14 8HF
The first six of these require 16K expansion, the rest are for unexpanded Vic. Mail order only
Subspace Striker: Most Pixel tapes are sci-fi games, all make excellent use of graphics (low-res, but the cleverest low-res we've seen) and sound: they also go in for a lot of detail — much background narrative, much artistry in the display (especially on spaceships). This game, like most of them, is recognisable: you bounce out of subspace to zap the enemy ships and get back before they retaliate. But it's still good. Price £9.50. G
Trader: A long one, maybe a bit *too* long. Your spaceship is looking for a colonisable planet; en route you find lots with mineral wealth on which you can stake claims. Avoid the hazards, though — black holes, supernovae, aliens, meteorite storms. Price: £9.50. G
Encounter: Aliens suck you into their UFO and probe your intelligence. If you fail, you get thrown out with the garbage. Recommended. Price £9.50. G
Zor: Battle the nasty robot medieval-style for control of earth. Price £9.50. G
Demo: A £3.95 trailer giving a taste of all the above, though it contains no playable games itself. If returned in good condition you get £2 off any one game. G
Brainstorm: Get three explorers and their Psion guides (intellectual snobs, and telepathic to boot — they figure in Trader too) across a lake of glup. Hi-res graphics on an unexpanded Vic. Price £4.50. G
Harvester: Up to four players reap rewards in the Boosterspice fields on the planet Delta. (What's Boosterspice? A narcotic "with unpredictable side efects", again featured in Tsader. Mine's a pint, please.) Hi-res graphics. Price £4.50. G
Guitar Pix 1: First of a guitar tutor series. Price £4.50. H
Vic Pix: Generate your own video paintings "in the style of modern artists". Needs Super Expander. Price £4.50. G

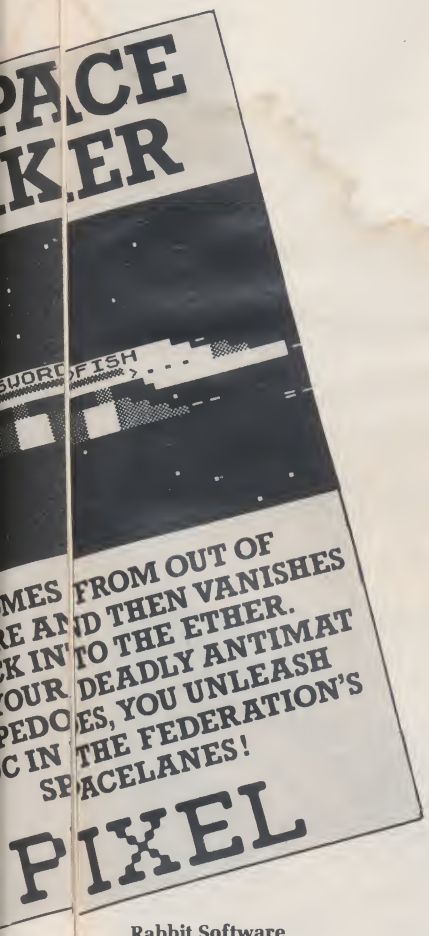


PR Software
28 The Fairway
South Ruislip
Middlesex
PRC1 — Six programs: War, Smashout, Blackjack, Logic, Pick-up, Alarm Clock. Mail order only. Price £7.50. G
Fly Snatcher: you live in a field of bushes, and you have to eat all the flies (blah!) before the weasel gets you. If your survive you'll get more flies and a faster weasel next time. Clever, fast, reasonable graphics. Mail order only. Price £7.50. G
Ant Raiders: Looks easy but isn't — the ants shuffle around the screen, you try to wop them. Mail order only. Price £7.50. G
Sub Attack and Missile Command: Noisy and colourful games, one with you blasting ships and the other with you zonking mutants. Mail order only. Price £7.50. G

John Probert
Studio
Wootton Hall
Wootton Waven
Warwickshire
Busvic-1: Six accounting programs

for the unexpanded Vic — sales, purchase, sales totals, purchase totals, bank account, and bank reconciliation. Price £16.95 [B]

Busvic-2: A wages system for businesses employing 2 to 200 people. Tax tables and insurance contributions are built in; weekly and monthly versions are on the tape. Price £16.95 [B]



Rabbit Software
380 Station Road
Harrow
Middlesex HA1 2DE

Rabbit Calc: Spreadsheet 'what-if' financial calculator with echoes of 'Visicalc'. Mail order only. Price £19.00. [B]

Rabbit Base: Multi-user data base program. Mail order only. Price £14.99. [B]

Rabbit Writer: A word processor with several good-looking extensions over the usual cassette-based WP packages. Can take a name-and-address file up by **Rabbit Base.** Filing program, reportedly good. Needs 16K expansion. Mail order only. Price £19.99. [B]

Myriad: Traverse the galaxies, defeat various nasties. Needs 3K expansion. Mail order only. Price £9.99. [G]

Frogger: Classic pub/arcade game — bring the frog home across motorways, logs, and turtles (which may submerge) while avoiding the crocs. Good graphics and machine-code speeds. Mail order only. Price £9.99. [G]

Space Storm: Good graphics on this version of 'Asteroids': recommended. Mail order only. Price £6.99. [G]

Ski Run: Giant slalom with three types of race and nine skill levels. Price £4.99. [G]

Cosmic Battle: Destroy enemy fighters with laser and photon torpedoes, fend off their attacks with your shields. Price £4.99 [G]

Night Flight: Try and land your 747 by following the instructions given. Be careful — your fuel's limited. Price £4.99 [G]

Super Worm: Rabit's version of the arcade game "Surround". Try and outwit the Vic's worm by making it crash into your tail. Price £4.99. [G]

Charset: Design your own characters. Price £4.99. [P]

Rabbit Functions: Define all 16 function keys as Basic words to speed up programming. Price £4.99. [P]

Romik Software
24 Church Street
Slough
Berkshire SL1 1PT

Shark Attack: Excellent machine-code game — you've been chucked overboard in shark-infested waters, and you have to ensnare them all in your net. Watch out for the giant jellyfish, too. Very difficult to get a high score! Price £9.99 [G]

Multisound Synthesiser: The best music-maker we've yet found for the Vic. Plays notes from the keyboard — but also chords; full ADSR enveloping and various 'voices'; built-in drum rhythms . . . and more. If you really want to hear what the Vic is capable of sound-wise, get this tape. Price £9.99 [H]

Martian Raider: Skim the planet's surface zapping cities, destroying ammunition dumps (gaining more time), shooting down the ground to air missiles and UFOs, dodging or blasting the meteorites. Price £9.99 [G]

Air-Sea Attack: Fly from your aircraft carrier, battle enemy planes, bomb the opposition's carrier and defend your own. Price £9.99 [G]

Mind Twister: Four puzzle games — Blackjack, Decipher (like Mastermind with colours), Four Thought (beat the computer at making squares), Teaser (add up numbers in boxes before Vic does). Price £9.99 [G]

Moons of Jupiter: Needs expansion. Price £9.99 [G]

Space Attack: Beat off aliens as you weave through space. Price £9.99 [G]

David Shambrook
3 Holford Road
Wootton PO33 4NL

Vic Games: Grand National, Mission Zorc, Fruit Machine, Grand Prix, Tennis, Air Attack. Price £6.50 [G]

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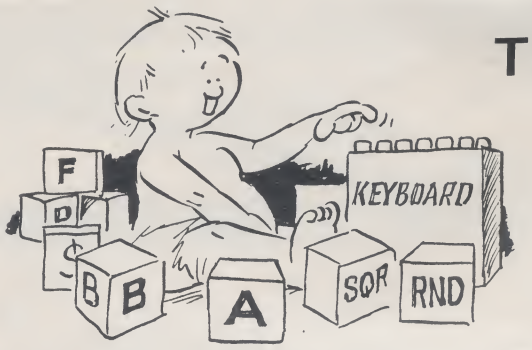
For further details please write to PFL at the address below, stating whether you are a parent or teacher, the type of computer available and in which subjects you are interested.

Programs For Learning, 4 Stanley Road, East Sheen, London SW14 7DZ. Tel. 01-878 6498.

Tiny



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Catalogue

Simons Magee Computers
13 York Street
Twickenham
Middlesex

Vic Music: Be a composer (if you have all of 16K expansion). Price £15.00. H

Simple Software
15 Havelock Road
Brighton
Sussex

Nice people with lots of Pet goodies and now some for the Vic.

Simply Write: Brand new Vic word processor, needs 16K expansion. Our pre-production copy had some bugs, but since then we've heard nothing but praise for this modest but economical package. Price £40.25. B

Simply Link: Cable and programs to link Vic to Vic or Vic and Pet. Clever and simple: the price includes five feet of cable. Price £42.55 P

The Software House
146 Oxford Street
London W1

That's the mail order address (add 60p P&P for postage). Call 01-493 3420 for personal shopping.

Vic Synth: Needs 3K expansion to make your Vic into a music synthesiser. Not tested by us, though. Price £9.95 H

Flip Disc: Needs 8K expansion. Described as "a board game like Othello". Price £5.95 G

Padded Cells: Needs 3K expansion. 3D maze game. Price £4.95 G

Marsh Hoppers: "Arcade action". Price £4.95 G

Pontoon Master: Price £5.95 G

Task Enterprises Computer Software
131 Gipton Wood Road
Oakwood
Leeds 8

Jouer 1: No French connection, as far as we can see. Four sound-and-colour games — Shaft, Simon 2.2, Space Breakout, Submarine Bomb. Price £4.00 G

Terminal Software
28 Church Lane
Prestwich
Manchester M25 5AJ

Line Up 4 and Panic Driver: Line Up is a beat-the-computer stack-up-counters board game a bit like Backgammon; Panic Driver is a racing car game. Mail order only. Price £7.95. G

Maze Muncher and Reversi: Consume dots, ghosts and fruits (?) in a maze (sound familiar?); then try your hand at the 'Othello' variant. Mail order only. Price £7.95. G

Skramble: "Probably the best game available for the unexpanded Vic" says Terminal Software; well, it is indeed pretty good. You fly over a whole series of different terrains towards your base, destroying the enemy's rockets, helicopters and oilwells as you go. Lots of variety, reasonable graphics. Mail order and from some dealers. Price £7.95. G

Tharstern
Knowlden House
Manchester Road
Barnoldswick
Lancashire BB8 5HQ

Picture Pro: Draw a picture on screen, press INST to automatically generate a saveable program which will reproduce it. Needs at least 3K expansion. Mail order only. Price £9.20. H

Super Fruiter: Great name! It's a fruit machine game with hold, nudge, gamble and shuffles. Needs 8K expansion. Price £9.20. G

Thorn EMI Video
Upper St Martins Lane
London WC2H 9ED

High-quality fast-paced arcade-type games with good graphics and fine packaging from this offshoot of the giant concern. More coming soon. Cartridges only, and only available from dealers: Thorn EMI doesn't recommend retail prices, so these are our guesstimates.

River Rescue: Navigate tricky river to reach intrepid but lost explorers; one or two players, joystick or keyboard. Recommended. Price about £21. G

Vic Music Composer: Write your own toons — up to 30 minutes' worth on an unexpanded Vic, a symphony of more than four hours with 16K expansion. Price about £21. G

Titan Programs
83 Ashwood Road
Rudloe
Corsham
Wiltshire SN13 0LG

Games Tape One: Six games. Price £5. G

Lunar Maths: Apollo to the moon and back via ten simple maths questions. Needs 3K expansion. Price £5. E

Roadrunner: Run the Roadrunner through "the space warp of vehicle molecular" (sic). Price £5. G

Android Attack: Here they come again, this time from Jupiter. Price £5. G

Missile Panic: "The most outstanding game yet for the Vic" according to Titan. Capture nasties, avoid missiles for £6. G

Space Hopper: Get your Space Frog through a crowded universe without being crushed (or worse). Fast, hi-res graphics. Price £5. G

Star Wars II: Space battles — get as many of Them as possible in two minutes. Price £5 G

Naval Attack: Zap the convoy from your battle cruiser. Price £5. G

Space Wars and Battlezone: Two two-player action games. Price £5. G

Vic Centre
154 Victoria Road
London W3 6UL
Stocks lots of games, especially the 'official' Commodore products, as well as three of its own.

Kestrel Note Writer: Basic word processing. Needs at least 8K expansion. Price £8.95 B

Kestrel Chequebook: Personal accounts. Price £8.95 H

Kestrel Addressbook: Keep track of your contacts. Price £8.95 H

Victay
12 Leahill Close
Malvern
Worcestershire
Mail order only. Deduct a quid from your total order if you buy two, £2 if you buy three.

Mortgage: Calculates repayments, period, interest rate; plots a histogram of your outstanding balance year by year. Very depressing, but useful. Price £4.99. H

Bank Balance: Could be almost as gloomy and probably as useful — the Vic shows in and outgoings with new current balance. Price £4.99. H

Spell: Kids' spelling test. Price £3.99. E

Secret Code: The Vic codes or decodes a secret-message word or phrase according to your key. Price £3.99. G

Maze: Wander around, avoid the robot. Price £4.99. G

Dodgem: Avoid the kamikaze driver as you dodge from track to track. Sounds like the M4 on Friday evenings. Price £4.99. G

Wedge
17 The Meadows
Flackwell Heath
Bucks HP10 9LX
Donkey Cong: Not unrelated to the arcade game 'Donkey Kong'. Price £7.49 G

LATE ENTRIES

Bytewise
8 Valentine Avenue
Sholing
Southampton SO2 8CR
House of Horror: With only one box of machines to light the way, can you find and steal the treasure from the unspeakable horrors that protect it? Ghosts, bats, floating skulls and zombies await you. Price £5.99 G

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Business

Simplicalc: 'Electronic worksheet' for financial calculations, especially 'what if' projections. Not bad at all, though it lacks some of the facilities you'd find in more sophisticated (and more expensive) spreadsheet packages on more sophisticated (and more expensive) micros. Recommended if you don't expect too much — and certainly if it's your first try with one of these programs. Needs 16K expansion, though. Price £24.95 (disk) £19.95 (cassette).

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Introduction to Basic Part 1: Excellent intro — good manual plus cassettes for example programs. Highly recommended. Price £14.95.

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mended. Cartridge only. Price £19.95.

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English Language: Twin-cassette GCE/CSE revision material. Sounds useful and seems ok. Requires 8K expansion. Price £9.99.

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Know Your Own IQ: Based on Hans Eysenck, of questionable scientific value, and highly biased towards spatial relationships. Still, it's fair entertainment. Price £9.99.

Know Your Child's IQ: Probably more valid as an indicator of **type** of intelligence rather than an objective assessment of **general** IQ. But it's well done — based on a respected book by two Institute of Psychiatry people, for kids aged 5 to 11. Needs 8K expansion. Price £9.99.

Know Your Own Personality: Eysenck again, and again of questionable scientific value: lots of fun, though the spelling lets it down. Recommended, even so: do it with your lover (as it were). Needs 8K expansion. Price £9.99.

Robert Carrier Menu Planner: Fair to good instructions for recipes, including a novel feature that lets Vic do all the meal planning and even guest selection for dinner parties. Needs 8K expansion. Price £9.99.

Vic Road User: Excellent Highway Code tester. Good graphics, ok humour. Recommended. Needs 8K expansion. Price £9.99.

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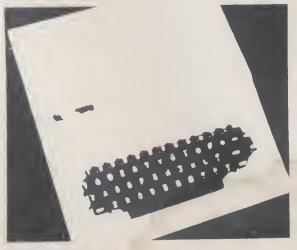

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Vision on the 64

by Steve Beats

With the Commodore 64 starting to reach the shops now — Commodore reckons 10,000 or so of them will have been shipped in the UK by 1 January — we invited ace 64 bloke Steve Beats to add some instant demo programs to his review in the last issue.

The Commodore 64 has a high resolution capability which produces a screen resolution of 320 by 200 pixels. For some obscure reason this fact is not even hinted at in the manual. So here is a routine to draw a high resolution shape on the screen with an explanation of how it is done.

Lines 10-40: Sets up the video chip and puts the screen into bit map mode for hi-res plotting. The screen now starts at 24576 instead of 1024.

Lines 50-60: Clears the hi-res screen and sets the associated colour RAM to white. If you watch the screen being cleared you will see how the RAM is organised.

Lines 70-100: This is a kludged function to produce a pretty little pattern on the screen. The x and y co-ordinates in the range 0-320 by 0-200 are sent as integers to the plot routine at line 2000. (You can replace this with any function of your own, of course.)

Lines 2000-2030: This is the main plotting routine which converts the x and y co-ordinates into an actual address on the screen and then sets one of the eight bits in that address according to its position.

This routine is quite slow, but it does give a good demonstration of the capabilities of the 64 when in high resolution mode. Of course, when the extra Basic cartridge becomes available graphics routines like this will be shortened and speeded up quite dramatically: and even the absolute beginner should be able to produce some quite impressive displays.

```
5 REM ***** PROGRAM TO DEMONSTRATE THE HI-RES SCREEN *****
6 REM
10 VC=13*4096+13*256:V=13*4096: REM POINTERS TO VIDEO CHIPS
20 POKEVC,PEEK(VC)AND254:      : REM SET UP VIC CHIP
30 POKEV+24,8:                 : REM CHANGE VIDEO MATRIX BASE
40 POKEV+17,PEEK(V+17)OR32     : REM SELECT BIT MAP MODE
44 REM
45 REM THE HI RES SCREEN IS NOW AT 24K AND THE COLOUR AT 16K
46 REM
50 FORX=0TO8192:POKEX+24*1024,0:NEXT
60 FORX=0TO1024:POKEX+16*1024,1:NEXT
64 REM
65 REM THAT CLEARED THE GRAPHICS AREA AND SET IT ALL TO WHITE
66 REM
70 W1=10:W2=100
80 FORS=0TO6.56STEP0.02:X=W1*SIN(S)+160:Y=W2*COS(S)+100
90 X=INT(X+.5):Y=INT(Y+.5):GOSUB 2000
100 NEXTS:W1=W1+5:W2=W2-5:GOTO80
1999 REM ***** PLOT SUBROUTINE *****
2000 Y1=INT(Y/8):Y2=Y-Y1*8
2010 X1=INT(X/8):X2=X-X1*8
2020 CH=(Y1*320)+(X1*8)+Y2:BI=2↑(7-X2)
2030 POKE24*1024+CH,PEEK(24*1024+CH)OR BI:RETURN
```

The following is a small basic program that shows just how easy it is to draw a couple of sprites and get them moving on the screen.

Lines 20-30: These lines set one variable to the start of the video chip, another to the address where the video chip looks for its printer to each block of sprite data.

Line 30: This line tells the video chip that the sprite data can be found in the 13th block of 64 bytes in memory (ie. 13*64 = 832) which is where the sprite data starts.

Line 40: This is the 'sprite enable' register. It is only a single byte; therefore, to enable each sprite you must set the corresponding binary bit. In this case we require sprites 0 and 1 to be enabled, which means that we want the binary number 00000011 in the enable register.

Line 50: Register 29 is used to expand the sprites in the x direction. In the same way as the enable register, each bit set expands the corresponding sprite. In this program only sprite 1 is expanded.

Line 80: There are the locations used to change the screen and border colours. They can hold a number from 0 to 15.

Lines 90-110: these just set the x and y co-ordinates of the 2 sprites in order to move them across the screen.

Lines 200-240: Each sprite requires 63 bytes of data for it be be drawn. To design your own sprite you should draw a grid 24 by 21 and fill in each square corresponding to a dot on the sprite. When you have finished you start at the top left and turn each group of eight squares or dots into a binary number, putting a 1 every time you find a dot and 0 if there is no dot. You should then convert these binary numbers into decimal and put them into DATA statements as in this program.

```
10 REM **** PROGRAM TO DEMONSTRATE SPRITES ****
20 V=13*4096:L=2040:D=832 :REM POINTERS TO VIDEO CHIP AND SPRITE DATA
30 FORI=0TO63:READJ:POKE1+D,J:NEXT:REM POKE DATA INTO CASSETTE BUFFER
40 POKEL,13:POKEL+1,13    :REM TELL SPRITES 0 AND 1 WHERE TO GET DATA
50 POKEV+21,3             :REM ENABLE SPRITES 0 AND 1. 3 = BINARY 00000011
60 POKEV+29,2             :REM EXPAND SPRITE 1 IN THE X DIRECTION
70 POKEV+39,1:POKEV+40,5  :REM MAKE SPRITE 0 WHITE AND SPRITE 1 GREEN
80 POKEV+32,7:POKEV+33,0  :REM MAKE BORDER YELLOW AND SCREEN BLACK
90 POKEV+3,100            :REM SET Y CO-ORDINATE OF SPRITE 1
100 FORX=1TO255
110 POKEV,X:POKEV+1,X:POKEV+2,X   :REM MOVE SPRITES
120 NEXTX:GOTO100
130 REM
140 REM **** DATA TO DRAW SPRITE ****
150 REM
200 DATA0,0,0,0,24,0,0,3C,0,240,66,15
210 DATA32,102,58,39,90,228,17,195,136,8,126,16
220 DATA4,0,32,2,0,64,1,24,128,0,165,0
230 DATA0,66,0,0,66,0,0,66,0,0,66,0
240 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
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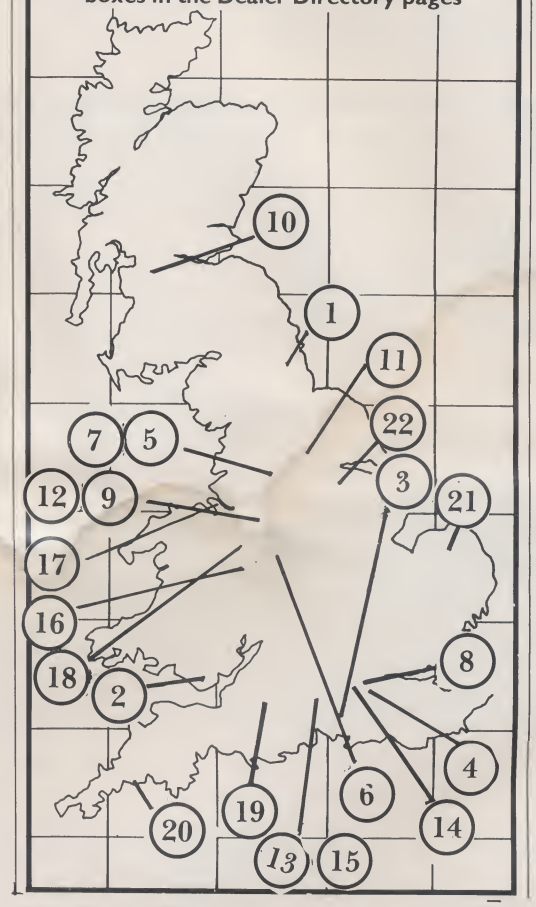

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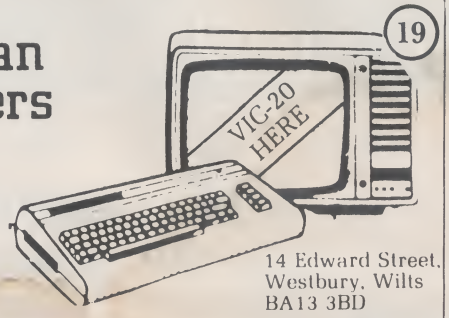

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Todd's Lore

Programs from magazine listings

by Mike Todd

VIC REVEALED, revealed

Regular readers will know that I'm no fan of **Vic Revealed** with its large number of errors and its atrocious presentation. To help those who bought a copy of the first edition, I produced a list of errata for the Vic user section of ICPUG (The Independent Commodors Products User Group). If you would like a copy, please send a stamped (20½p for 2nd class) and addressed envelope (at least 6x9ins) together with £11.00 (to cover costs) to me, c/o Vic Computing. It has 17 A4 pages and contains details of over 450 corrections or additions to the book.

The same author is reported to have produced another book, this time on **Vic Graphics**: and if it's anything like **Vic Revealed** I would recommend that anyone contemplating buying a copy wait until its worth is proven. We may be lucky and find a useful and well put-together book.

To buy or not to buy

One question I am asked a great deal is "Should I buy a Vic 20 or wait for the Commodore 64?" It's a difficult question to answer.

The Vic 20 is now well established and falling in price; it has much software available and is a useful machine. The 64 is twice the price, but at least there is no need to buy additional RAM.

My own feeling would be to buy a Vic — especially if you want one for Christmas as the 64 is not likely to be widely available until the new year. If you find that it is too restricting; or if you want the extra memory, the more sophisticated graphics and sound, the ability to add a Z80 processor and the 40 characters per line; then Commodore should be offering an upgrade to the 64 for significantly less than the cost of a new one. *(See the 'Eye on Commodore' interview — Editor).*

If you go for this option, be warned that some software written for the Vic will not transfer to the 64. It is true that some could be converted, but it requires a good working knowledge of both machines. Most hardware, however, such as the printer, joysticks, light pens and the disk drive, will work on the 64 — although the disk drive will require a chip (ROM) to be changed.

More bugs

In the last **Lore** there is a typing error in the short program in the fourth column. There should be a semicolon at the end of line 120. Omitting it makes the display a little difficult to read!

On page 12, I refer to the ability to mark a file as being the last on the tape. What actually happens is that a special END-OF-TAPE marker is written as soon as you CLOSE the last file on the tape. In fact you can also do the same when you SAVE a program to tape by using the format SAVE "PROGNAME", 1,2 (where the 1 designates the cassette and the 2 indicates, just like with OPEN, that this is the last on the tape).

If you've tried this, you'll have noticed that the error message produced is not "FILE NOT FOUND" (although it should be!) but a "DEVICE NOT PRESENT" error. This is due to a bug in the Vic and there's not a lot that can be done about it.

Programs from magazines

The advantage of a Vic over a dedicated games computer is the ability to get games (and other software) in the form of cartridges, cassette tapes and floppy disks all from a variety of sources and at prices ranging from under a fiver to over a hundred pounds.

But there is a fourth, and very cheap, way of getting software: and that is the computer magazines, of which there seems to be a huge selection. These programs are provided as listings which need to be typed into your computer and saved on to cassette for future use.

There are a number of pitfalls to be aware of when using magazines as a source of programs, not least of which is the question of which computer the programs are designed to work on. Sometimes this is actually stated; but in some magazines it is not and it is up to the reader to determine this for himself. This is by no means easy.

If the machine is not specified, a quick look through the listing may give a clue. Look for unfamiliar commands — if there are any that are not implemented on the Vic then I would forget it. Look for Vic-style graphics characters — although bear in mind that the PET and SHARP MZ80 have similar graphics. Look for familiar POKEs — if there are some unfamiliar POKEs then maybe they're not intended for the Vic (this requires a bit of experience to spot).

And if all else fails, you can always try typing it in and see if it works — or better still, ring the magazine and ask them. They'll get sick of being pestered and will soon learn to state which machine the programs are designed for. This also applies if the configuration of the Vic needed is not stated.

The next step is the laborious task of typing in the program. There is little doubt that even an elementary understanding of Basic will make entering the program very much easier because you will be typing something that is reasonablly familiar.

Watch out for the difference between the number "1" and letter "I" or zero and the letter "O" — the zeros normally have a slash through them.

Be careful when typing numbers in the program — a mistype here could go unnoticed for a long time.

Colons and semicolon, fullstops and commas are easily confused — colons are only used to separate two statements in a line and will be followed by one of the Basic command words, while semicolons only appear in PRINT and some INPUT statements. Full stops never appear as part of a BASIC statement except as part of a decimal number, while commas occur in many Basic statements.

Finally, any combination of characters can appear within quotes; and it is important that these are typed carefully, otherwise the resulting display could be very odd indeed. Take careful note, too, of the number of spaces or other repeated characters.

Typing these characters is probably the hardest task: it is often quite difficult to read the text and determine exactly what is meant. You will know that as soon as you type the first set of quotes pressing a cursor control key will not move the cursor but will produce an odd character on the screen. A second set of quotes cancels this and allows the cursor control keys to operate normally. This is designed to allow you to include cursor control codes within the strings of characters which will move the cursor according to these codes when printed.

When the program is subsequently listed, these codes appear as reverse field characters and are not very easy to follow. Some magazines turn these codes into self-explanatory messages; for instance <HOME> means the 'cursor home' key and <CUL> may mean the 'cursor left' key. Others simply print the listing as it comes off the printer and then it is important to be able to convert these reverse field characters into cursor control keys. The list of display codes on page 25 of the October edition of **Vic Computing** will certainly help here, but it doesn't take long to become familiar with these codes.

Although all characters appear on the listing as they appear on the screen, there is one exception: the pound sign. Although it will appear correctly on a listing from the Vic printer, the Pet printer doesn't have a pound sign and you will get a backslash (just like the "/" divide sign except the other way round).

Typing a long program can be a time-consuming business. I would suggest that you keep a tape in the cassette machine while typing and once in a while type SAVE. This means that you keep a copy of the program in case of mains failure or some other natural disaster. If you do this every 10 lines or so, and list the latest 10 lines on the screen, it will allow you to check your typing against the original while the backup is being made.

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Toolkit Corner

I would also suggest rewinding and VERIFYing the program periodically as I have heard of instances where corruption has occured. After a long typing session, with intermediate versions SAVEd, the final result was so corrupt that the whole program had to be typed again. The time lost in SAVEing and VERIFYing is small compared with the time taken to retype the whole listing.

Once you've typed the whole program and you have a verified copy on tape, you can type RUN and see what happens.

You'll more than likely get a SYNTAX ERROR or something similar. List that line and compare it with the original since there's probably a typing error.

If the error is other than a SYNTAX ERROR, the fault may be somewhere else — a DIVISION BY ZERO ERROR, for instance, could be due to be variable not being set correctly earlier in the program. Even if your understanding of Basic is very basic (sic) you should be able to track down most errors.

Sometimes you could be searching for a long tme, though, and in this instance it may be better to check the whole program with the original print-out again — several people have found this easier if they can enlist the help of a friend who can watch the screen as you read out the history.

If you don't find an obvious typing error it is very easy to blame the magazine or the program author for not debugging the program correctly. I have seen people give up very quickly with the comment that there must be a bug in program, but it's nearly always been their typing to blame.

That's not to say programs never appear without bugs. They do! But usually the errors are obvious and stupid — like lines of the program being omitted. Unfortunately there are occasions when a poorly-tested program does appear, and there's vey little one can do about it.

If you are certain that you've typed the program in exactly as listed, and you can't find any bugs, don't hesitate to contact the magazine: it's more than likely that they are aware of the problem and have a solution.

If something disastrous happens during the running of the program, try to pin down the area most likely at fault. You can do this by inserting a STOP command in the middle of the program — if the fault occurs before the program aborts, try moving the STOP nearer to the start of the program. That way you may be able to isolate the section of program at fault and it is also a useful technique for debugging your own programs.

If it is the screen that goes haywire or the Vic crashes (that is, it appears to stop functioning) it could be that you've got a POKE value wrong. The numbers following a POKE or a PEEK must be correct and are probably worth a double check as their effects, if mistyped, can be very mystifying.

Functions

Dr. Alan Grant of Victay in Malvern sent in this note showing how you can have up to 32 different function keys on the Vic. They are accessed by the four function keys in combination with the various shift keys. The shift keys give the following results in register 653:

No shift	0
SHIFT	1
COMMODORE	2
SHIFT + COMMODORE	3
CTRL	4
SHIFT + CTRL	5
COMMODORE + CTRL	6
SHIFT + COMM + CTRL	7

The function keys themselves produce the following results in register 203:

Top (f1)	**39**
Second (f3)	**47**
Third (f5)	**55**
Bottom (f7)	**63**

Try the following program:

```
10 S = PEEK(653):K = PEEK(203):
   IFK = 64THEN40
20 K = (1 + K)/8-4:PRINT"KEY"K
   + 4*S
30 GOTO10
40 PRINT"NO KEY":GOTO10
```

It is convenient to relabel the keys from top to bottom as KEY1 to KEY4.

The program then produces the results summarised in the following table:

	KEY1	KEY2	KEY3	KEY4
No shift	1	2	3	4
SHIFT	5	6	7	8
COMMODORE	9	10	11	12
SHIFT + COMMODORE	13	14	15	16
CTRL	17	18	19	20
SHIFT + CTRL	21	22	23	24
COMMODORE + CTRL	25	26	27	28
SHIFT + COMM + CTRL	29	30	31	32

Note that depressing the SHIFT and COMMODORE keys together will change the display to the alternate character ROM continuing the upper and lower case alpahbet. Just press them again to return to the usual character set. Pressing the CTRL key will slow down program execution, and this shift key should be used only if the program is waiting for an input.

Renumber

Everyone who writes programs occasionally needs to renumber lines — or at least **ought** to. Crowded programs are difficult to understand and soon become impossible to amend. Now, there are 'programmers' aid' add-ons from both Commodore and Stack that give you extra commands including RENUMBER: but until you can afford one of them, here's a neat little routine from A. R. Mulholland of Nottingham which will do at least part of the job.

```
0 INPUT LN,IN:SE=4095
2 SE=SE+1 IFPEEK(SE)<>0THEN63001
63002 SE=SE+3:TV=INT(LN/256)
63003 POKESE,LN-TV*256:SE=SE+1 POKESE,TV
63004 LN=LN+IN GOTO63001
```

Type in this lot **with** the program you want to renumber and RUN 63000 (though obviously the line numbers in the routine can be any you want, providing they come **after** the last line in the program you want renumbered).

In the code variable LN is line number; IN the increment; SE the 'searching for line number' variable; and TV the transient variable (used to save space).

When you run it, you will be asked for two numbers — the first is the line at which you want the renumbered program to start (usually 10), the second is the step between lines (go for 10 again). The program will then get going, stopping with an error message when it reaches itself. You then have to delete the renumbering routine; and you'll be left with the original program, unchanged but renumbered.

It doesn't change GOSUBs or GOTOs, though, so watch out for them — try marking their position in the original program with a REM, and then go back through the listing to change them manually.

This useful little program uses only 155 bytes: not bad at all.

Column print

When he bought a Vic printer, Vic Barton was rather taken back by the Heath Robertson way of printing columns. "The TAB command just produces rubbish, but I wanted to reduce it to the bare minimum. To make matters worse the columns are numbered 0-79."

So he wrote a small routine to run at the start of a program that places the character code along with the column number into an array. By using this routine it is just necessary to specify the column number only (which now runs from 1-80 rather than from 0-79).

```
10 DIM CH$(80)
20 FORI=1 TO 80
30 IF I<11 THEN CH$(I)=CHR$(16)+"0"+RIGHT$(STR$((I)-1),1):GOTO 50
40 CH$(I)=CHR$(16)+RIGHT$(STR$((I)-1),2)
50 NEXT I
60 REM COLUMN NUMBER IS 'CN'
70 REM METHOD OF ACCESS IS- PRINT#4,CH$(CN);"STRING"
```


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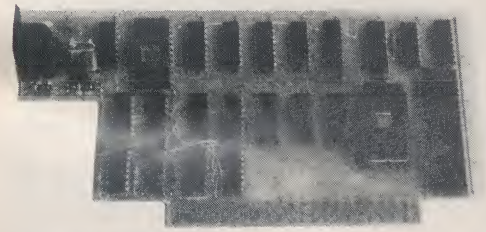

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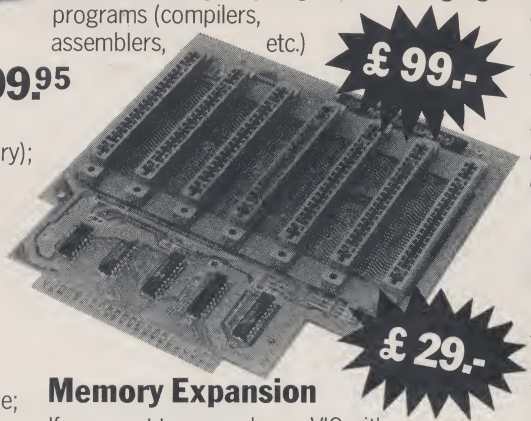

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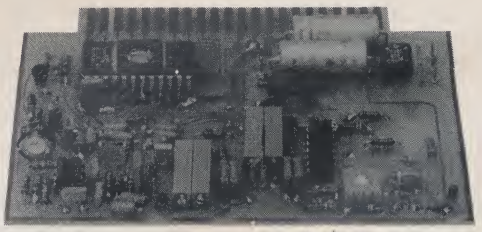

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routines

Stardate clock

```
10000 REM GAMES CLOCK
10005 IFC>0THENC=C-1
10010 POKE38400+R*22+C+4,6
10020 POKE38400+R*22+C+5,6
10030 POKE7680+R*22+C+4,46
10040 TM=(INT(TI/1000)-(INT(TI/10000)*10))
10050 IFR=0THENPRINT"■";:GOTO10070
10060 POKE214,R-1:PRINT
10070 Y=C:IFINT(TI/10000)<100THENY=Y+1:IFINT(TI/10000)<10THENY=Y+1
10080 POKE211,Y:PRINT(INT(TI/10000))
10090 POKE7680+R*22+C+5,TM+48
10100 RETURN
```

Written by Chris Durham for a **Star Trek** and useful in other games, this artificial clock adds 0.1 units approximately every 16 seconds. This is fast enough to be exciting in the final minutes of a game, but it's not so quick as to be irritating — and it leaves plenty of time for your program to run other routines in between updating the clock.

You can test for elapsed time in the normal way by looking at TI or TI$; so your game could be running in real time and you will also be able to see time ticking away.

The clock display takes up five character positions. Because of the extra space required for the sign bit it cannot start in column 0; you can however position it anywhere else on the screen by setting 'R' and 'C' to the required row and column respectively.

EXAMPLE

```
2 TI$="063055"
5 PRINT"■"
7 PRINT" ■SDATE■"
10 R=2:C=0:GOSUB10000
20 FORM=1TO1000:NEXTM
30 GOTO10
```

Rising screen

This routine (by Chris Durham again) gives you a novel alternative to the way a screeful of instructions normally appears *en masse* at the start of a program. Precede your lines of print with a POKE 36865,160 to remove the screen; after printing the text, a GOSUB 1000 will raise it from the bottom.

```
1000 FOR SH=160 TO 38 STEP-0.1
1010 POKE36865,SH
1020 NEXTSH:RETURN
```

EXAMPLE

```
, PRINT"■":POKE36879,25
10 POKE36865,160
20 PRINT"THIS IS A DEMO OF THE RISING SCREEN ROUTINE"
30 FORA=1TO5:PRINT:NEXTA
40 PRINT"IT CAN BE USED FOR ANYPROGRAM WHICH DISPLAYS";
50 PRINT"INSTRUCTIONS OR LARGE PAGES OF INFORMATION"
60 FORA=1TO5:PRINT:NEXTA
70 PRINT"BY CHANGING LINE 1000 TO 'FOR SH=38 TO 160'"
80 PRINT"IT CAN BE MADE TO RUN THE SCREEN BACK DOWN"
90 GOSUB1000
100 END
1000 FOR SH=160 TO 38 STEP -0.1
1010 POKE36865,SH
1020 NEXTSH:RETURN
```

Input

This one gives you all the facilities of the normal INPUT command — without its limitations, without the '?' appearing on the screen, and with some validation of the input.

Input can be made on any part of the screen. It shows a flashing cursor; it allows use of the delete key, but will not accept any non-printing characters (omit line 60035 if you want 'return' on its own to be a valid input). By Chris Durham.

```
60000 REM********** INPUT ************
60010 POKE198,0:DX$="":TC=TI:FL$="■ ■■"
60020 GETE$:IFE$<>""THEN60030
60022 IFTI-TC<20THEN60020
60024 IFFL$=" ■"THENFL$="■ ■■":GOTO60028
60026 FL$=" ■"
60028 PRINTFL$;:TC=TI:GOTO60020
60030 IFE$="■"ORE$="■"ORE$="■"ORE$="■"ORE$="■"ORE$="■"ORE$="■"THEN60020
60035 IFE$=CHR$(20)ANDLEN(DX$)=0THEN60020
60040 IFE$<>CHR$(20)THEN60060
60050 E$=LEFT$(DX$,LEN(DX$)-1):DX$=E$:PRINT"■ ■";:GOTO60020
60060 IFE$=CHR$(13)THENPRINT" ":POKE204,1:RETURN
60070 DX$=DX$+E$:PRINTE$;:GOTO60020
```


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The other thing was that Andrew seemed to get the most kicks from the simplest reaction-time games rather than my more complicated Space Invader type games. Again, maybe he just needed more time to play about without father and uncle around to put him off. It will be a while yet before we know whether he shows signs of wanting a micro himself, though he played all evening and every evening.

I also had my old friend Freddie to stay and he too fell into the web. Now Freddie, champion archer and club chess player, is an ardent non-techno man — how I remember our old science lessons at school! It took me a good half-bottle of the best to lure him into Vic's lair.

But once Vic had won a couple of games of Rainbow Passage, and the Alien had run rings around him a few times, Freddie took the bait and set to in earnest. He picked up the LOAD, RUN, NEW and memory expansion procedures in a few minutes and settled down to a solid week's games-playing, finally deciding that VicGammon was the best challenge (one session lasted from breakfast through till nearly dawn the next day).

That was when I finally picked up the rules of the game. BugByte's Vic Gammon instructions only made sense to me after demonstration, but I had not really tried to figure it out properly before anyway. Now of course I'm hooked. I may be a useless player but try telling me that at 3.30 in the morning!

I also withdraw my comments last time about VicGammon's graphics. They are quite adequate; and for a strategy game in only 6K of memory you can't really expect hi-res, can you?

I have to declare a preference for this type of game rather than the fast-reactions Space Invader style — though they can overlap of course. I do just love hi-res imagery! Can't win, can I? What I want I suppose is a Super-Adventure game (have to have 32K and disk I reckon) with wild hi-res shoot-outs combined with mind-bending strategy games all wrapped up in one grand design. Then I could lose every time!

Talking of 32K plus disk, would I have to expand my Vic up to full memory to be able to use a disk, or a printer? I haven't much use yet for a printer but I am begining to find the delay on my cassette unit a bit irritating. I would like to be able to load, save and so on instantaniously.

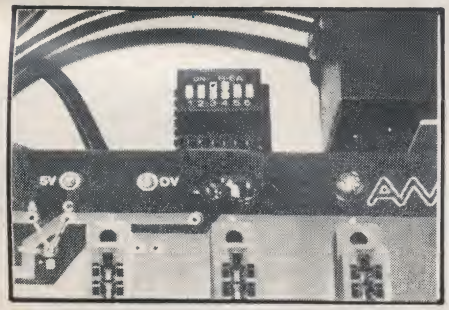
Another question; as Commodore's disk and printer are so pricey (well I think so) what do you think of the alternatives? I speak of the el-cheapo Amber 2400 printer from Amber Controls Ltd. and the micro disk from our Little Red Brothers at BATS-NCI Ltd?

On a different tack, I wish there was some way round the problem of those programs which cannot be cleared from memory without switching the whole thing off. Couldn't Commodore have got over this with some kind of overriding 'clear memory' key?

Another little problem someone might be able to offer a hint on, is with my Vic's acceptance of answers in a maths test program I am trying to amend. I wanted to limit the accuracy of answers for division problems to two or three decimal places, but could not see how.

The command INT(X) and LEFTS(X,X) seemed possible solutions at first (see how far my Basic has got) but I soon realised neither would do the job. I then discovered that if the answer to a division problem was taken to the eighth decimal place my Vic would not accept as correct a rounded-up answer — not even a rounded down one, nor yet an un-rounded one. It wouldn't even accept as correct the answer it had calculated for the same values (which was of course correctly rounded up). Why? I wish I had made a note of the values which gave this odd result, but I was so thoroughly confused by this time I gave up.

Have I discovered a Bugintherom? I'd like to have a bug named after me — not quite as romantic as a Luna Sea but it appeals to my warped sense of humour. Ah well, back to Basics.



The Durham modification in place — switchbank installed at the back of the Arfon pcb, epoxy-resin 'key' on top, and a cut in the printed circuit to socket 1 on the left.

Continued from page 15

There are times when you will want all combinations of memory from no additional RAM through an extra 3K up to a full 32K, depending on the program you wish to run. By switching in the relevant RAM cartridges before you turn on the main power you can set the Vic to run anything from a 3.5K machine code program up to a 32K 'Adventure' program, all without removing a single cartridge or having to run additional software.

One important final point to remember is not to switch any of the cartridges on or off while the main power is switched on. Not only might you damage a cartridge, but the Vic would not know that there had been any change and would therefore no longer function correctly.

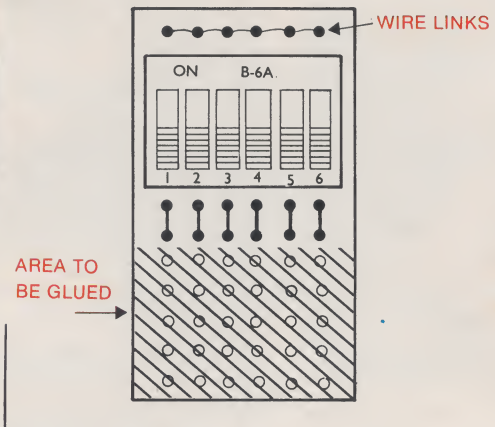


FIG 3A

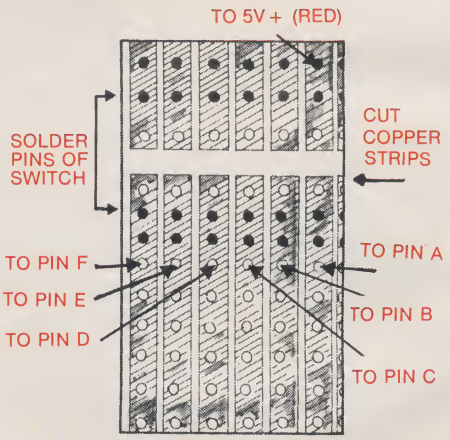


FIG 3B

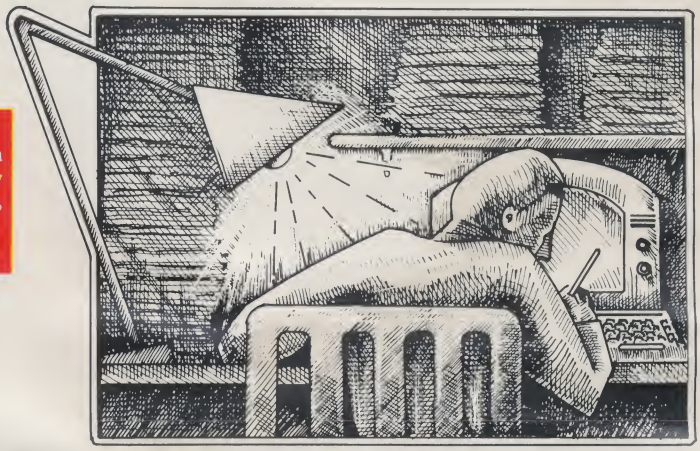
FIG 3C

PART LIST

35mm x 20mm Veroboard, 0.1in spacing
six-pole DIP switch bank
approx 1 metre single-core wire or six-way ribbon cable
epoxy glue

Tommy on Piracy Protection — and more

Tommy is our resident technical expert. All the technical queries we get on the Vic are passed straight on to him, and nearly all of them will get a reply — usually in this column of the magazine rather than a personal missive, though you might just be lucky.



Dear Tommy, Can you give me a subroutine to be included as part of a program that will prevent that program from being SAVEd on tape or disk unless those lines are specifically removed?

This might protect me and other hobbyists from pirates unless they are patient and clever enough to search through the listing to remove the instructions.

I am a newcomer to computing and very, very sleepy (too many late nights!). I also tend to mutter under my breath, gaze blankly into space and answer my wife with grunts. Is there a cure for this addiction to the hobby? If so don't tell me.

Can POS(X) and TAB(X) be used instead of cursor controls, and if so how?

I am afraid that it is impossible to protect your programs simply by adding a few lines to a program. There are several companies worldwide who sell protection software and hardware, but these are aimed mainly at software houses and tend to cost many hundreds of pounds. I have been involved in the microcomputer industry for pushing ten years now, and each time somebody produces a foolproof protection system somebody else produces a way to crack it. As Sherlock Holmes once said, "What one man can invent another can discover".

As regards the cure for your mental problems, I found that turning the hobby into a profession very quickly cured the addiction — but not the symptoms!

The POS(X) function basically tells you how many characters you have printed on the current line, which in my opinion is pretty useless because any programmer who doesn't know how many characters he has printed is not worth the title. My opinion is somewhat strengthened by the fact that I have never seen a professionally-produced program which used this function (but please don't write to tell me of any which do!).

There are two functions which you will find useful in PRINT statements, SPC(X) and TAB(X). SPC(X) moves the cursor right X positions, and TAB(X) moves the cursor to column X.

I, and everyone else who doesn't use POS(X), will utilise TAB(X) and SPC(X) for laying out data on the screen, in columns for example. Unfortunately they are no replacement for the cursor up, down and left characters.

Dear Tommy, I have an expanded Vic and am experiencing problems. I wonder (hope) if you can help me. Does anybody produce a program which fools the Vic into thinking that it is unexpanded? If I continually remove my add-on RAM cartridge the contacts will wear. I am thus unable to access a wealth of software as it will not run in an expanded Vic. I have tried myself to alter the registers inside but with no success.

Try this little program:

```
10 DATA 169,0,141,129,2,
   141,131,2
20 DATA 169,16,141,130,2,
   169,30,141,132,2
30 DATA 141,136,2,32,24,229,
   108,0,192
40 FOR I = 1 TO 27
50 READ A: POKE 8191 + I,A
60 NEXT
70 SYS 8192
```

Dear Tommy, I have recently bought a Vic-20 with a 24K expansion unit. In some high resolution graphics programs the top of memory pointer is moved using the statements POKE 51,255: POKE 52,19: POKE 55,255: POKE 56,19. On my machine this leaves me with only a little over 500 bytes of free memory (a tragic waste). The 6561 register is changed using the statments POKE 36869,253: POKE 36866, PEEK(36866) or 128. This instruction seems to send the computer into a state akin to catatonia.

Cold you please tell me what I should do to lower the top of memory by some 2048 bytes to accommodate a set of user-defined graphics, whilst maintaining as much memory as possible, and what I need to do to get the 6561 register to address the new graphics set. Trial and error have only resulted in the loss of large lumps of hair.

Let me start off with a warning. If anybody else writes to me boasting that they are "pulling their hair out" I will personally visit them to pull the rest out. Not everyone has hair to waste and I spend most of my time trying to glue mine back in!

Owing to the design of the 6561 chip which controls the screen on the Vic, together with the joysticks, paddles, and light pen, there are only a few usable positions in RAM for the character generator. As you have found out, the position used by an unexpanded Vic leaves only a few bytes of program space when applied to a machine with the 24K expansion added.

The solution is not to lower the top of memory, but to raise the bottom! How's that for lateral thinking? This subject, together with many more tips relating to graphics on the Vic is covered by Chris Preston in an article in the next edition of **Vic Computing.**

Dear Tommy, In the manual it says that the cassette recorder and the cassettes themselves should be kept away from the TV's magnetic field — the manual actually says six feet away. However in all the pictures I see of expansion systems etc. the TV and cassette recorder are side by side, indeed touching one another. How serious is this requirement?

I have been using the screen to design Fair Isle knitting patterns, but would like to use the Vic to work them out; how do you persuade the computer to divide one figure into another and tell you the *remainder* instead of dashing off into a string of unwanted decimal places?

Always glad to help a damsel in distress! The cassette recorder should be as far away from the TV as is possible. Obviously a small portable TV has a weaker magnetic field than a 26in mammoth. The cassette should not really be touching the TV — certainly it should not sit on top of the set, adding heat to the magnetic effect — but two or three feet should be enough.

As for your second question, if you want to divide X by Y and find the remainder, use this expression:

```
X-Y*INT(X/Y)
```

By the way X should be greater than Y, otherwise the answer is just X.

Dear Tommy, If I randomly POKE 250 or 300 characters on to the screen, is there any way by which I can record each value as it is POKEd? This is for a 'maze' game: I want to know if the player bumps into the maze wall. Has it got anything to do with DIM?

It has nothing to do with DIM, but I will explain anyway! When you POKE a character on to the screen, all you are doing is putting a value into a particular screen location. The Vic hardware reads the value in the location and displays the corresponding character on the screen. As the value is still in the memory location, you can always read it back with a PEEK.

In your case, what you need to do is this. Before the player moves you have to check the space into which he wants to move, to test if it is empty. Assuming the variable X contains the location of the player on the screen, you need to test:

```
F-22 . . . . . for a move UP
F + 1 . . . . . for a move RIGHT
F + 22 . . . . . for a move DOWN
F-1 . . . . . for a move LEFT
```

Dear Vic

Not having access to a Pet I experimented to find this way of inputting the TINYMON program into my Vic. You will need an expanded Vic and have to type the values in as DATA statements. Then add a basic loader (I used the one in Nick Hampshire's **Vic Revealed**) and append the following lines:

```
8000 OPEN 1,1,1, "PROGNAME"
9092 R$ = "POKE":S$ = ","
9094 P$ = R$ + STR$(L) + S$ +
   STR$(N)
```

Amend lines:

```
9100 PRINT £1,P$
9140 CLOSE 1:END
```

The first data value will depend on how much memory you have — make it the start of Basic.

RUN the program and it saves a long file (it takes a few minutes). When finished rewind the tape and clear the memory, then type directly

```
POKE 43,1
POKE 44,4
POKE 45,20
POKE 46,8
POKE 47,24
POKE 48,8
POKE 49,24
POKE 50,8
```

After this use the 'merge' procedure to POKE 191,1: OPEN 1. When the Vic has found the file clear the screen, type three cursor downs, the then type:

```
PRINT "home": POKE 198,1 :
   POKE 631,13: POKE 153,1
```

When 'return' is pressed the Vic will be poking the values directly into their proper locations.

When finished type SAVE or RUN — the program will be in memory.

G D Cossins, Leeds

I have had a Vic-20 for several months now, and wish to try my hand at machine code programming. After seeing the TINYMON 1 program in your April issue, I wonder if any of your readers might have a Pet suitable to load this TINYMON 1. If anyone can oblige, I live in the Bristol area and can be contacted after 6.30 pm on (0272) 852598.

Paul Knight, Bristol BS19 2AE

Can anyone oblige me by selling me a copy of TINYMON 1 as I do not have access to a Pet but would like to use this Machine Code monitor.

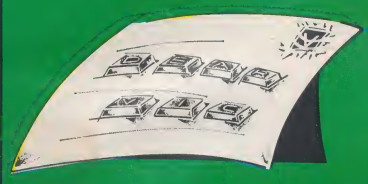
P Tveson, 3 Tower Gardens, Westhill, Inverness

Rally round, folks. By the by, we've had a number of Victuals submissions that give you Jim Butterfield's TINYMON monitor via DATA statements on a Vic. We're deciding which is the best, and we'll publish it soon.

Incidentally, I am a Commodore 'Jelly Monsters' addict: how good is my best score of 124,830? And what's the yellow thing that appears after the pineapple? What's the blue thing after the purple dish?

Colleen Young, Croydon

No idea. Any contributions?



I regularly run programs on Vics and Pet, as I have a Vic at home and Pets at the school where I teach. Personally I have found Vic very good for educational programs though it does not seem to get much of a mention in this field. I have written a large number of programs (especially statistical and mathematical): is anyone interested?

It is interesting to see such a large number of articles in your magazine concerning Vic/Pet transfers. I think a careful distinction needs to be made between methods: POKE 4096,0; POKE 41,16; CLR etc is fine for listing and running, but if the program is saved on tape each time you load the program you still have to go through the POKE 4096,0... routine. If however you relocate the Vic program to the start of Pet's memory (see 'Vic into Pet won't go' in issue 2) and then save it, you have a program which can be run on Pet without further ado!

Incidentally, I am a Commodore 'Jelly Monsters' addict: how good is my best score of 124,830? And what's the yellow thing that appears after the pineapple? What's the blue thing after the purple dish?!)

Colleen Young, Croydon

I have written the following short program to demonstrate a 'bug' I have found in my Vic:

```
10 PRINT "[CLR]": REM CLEAR
   SCREEN
20 POKE 36879,8: REM BLACK
   SCREEN
30 * TI$ = "000000": REM SET
   CLOCK TO ZERO
40 IF VAL(TI$)<15 GOTO 40:
   REM LOOP UNTIL 15
   SECONDS HAVE ELAPSED.
```

When this is run, a '@' character flickers in the top left hand corner of the screen. To overcome this fault, line 40 has to be changed to use TI instead of TI$:

```
40 IF TI<(15*60) GOTO 40
```

I have also had difficulty when using the LOAD statement in a program to automatically load and run the next program on a tape. When I ran my first program with a LOAD statement in it, it appeared to load the next program (a game which uses the new characters) without any problems — until it started to RUN it. I was then faced with a syntax error message at the start of the program, although the program was error-free. The Vic crashed after I listed the line in error, which was full of rubbish!

Something I found useful, and may be of use to other Vic users, is the discovery that programs saved on tape can be re-recorded using audio tape recorders (I used a portable and hi-fi) and the copies can be loaded on the Vic with no problems. This method can be used on full tapes with several programs on each side, without the tedious task of saving and loading each time a copy of a tape is needed. This makes me wonder if the Vic cassette unit is really necessary for the Vic?

Lastly I would like to know if Commodore will be reviewing their prices of Vic-20 peripherals, which at the moment are beyond the budget of the average micro enthusiast? I am of course referring to the launch of the Spectrum and the 'Micro-Drive' soon to follow. How long will it take before someone markets an interface for the Vic and the Microdrive as has already been achieved for the Sinclair printer?

Michael Maxwell, Andover

...As for peripherals prices, elsewhere in this issue you'll find mention of a couple of low-cost Vic interfaces for the ZX printer; and like Michael we suspect it won't be long after the launch of the much-heralded but yet-to-be-seen Sinclair Microdrive before this 3.25in floppy disk unit can also be plugged into the Vic.

Sinclair is talking about £50 for the Microdrive, which certainly sounds impressive. But at least Commodore has just slashed the price of its own disk — which stores more, will probably provide faster access, and has no hassles over delivery or reliability. Not that we're suggesting the Microdrive will share the same kind of problems exhibited by some other Sinclair products...

With regards to the letter in your October 82 edition, I do not think you "got it wrong". Judging by the time I had to wait to acquire a Super Expander cartridge and the demand at my local dealers, owners of the aforementioned cartridges are not in the minority.

I have been purchasing your excellent magzaine from the onset and believe that you should be the leaders, as you were with the publication of the programs for the S.E. when you lead, other magazines follow. So keep up the good work.

Please publish other S.E. programs when available. You will find an eagerly awaiting public.

Kevin Hulston, Stockport.

This is one of many letters we've had congratulating us on the Super Expander programs. So expect a few more!

I have just purchased a Vic and there is one thing that puzzles me — in some places the maximum memory expansion is given as 32K bytes, in others it is 29K. Well, which is right?

James Murphy, Leeds

In fact the maximum memory range that can be addressed directly by an eight-bit microprocessor like the Vic's 6502 chip is 64K bytes, and we have heard that Someone Somewhere has indeed succeeded in running a Vic with 64KB (no, we don't know who or how). But Commodore's standard Vic-20 has a memory limitation of 32K bytes, a restriction that is imposed by the hardware design apparently to simplify things in there.

Now, you can add expansion memory to the 32KB limit. So where do all those remarks about the Vic running less than 32K come from? Well, on the full system some memory will be needed by the Vic itself: for programming in Basic you have a maximum of about 27,500 bytes available for your programs.

The other below-32K reference happens because some people ignore the 3.5KB you start with inside the Vic; so the maximum *expansion* memory is 28.5KB, often inflated to 29K for the purposes of writing advertisements.

Incidentally we're doing a quick round-up of all the expansion memory units we can find for our next issue. The range of prices is surprising!

Send us comments, queries and complaints: we'll answer everything we can and print anything that isn't boring or illegal. Address yourself to The Editor, Vic Computing, 39-41 North Road, London N7 9DP

This best seller was written by our Editor, Dr. Peter Holmes, and takes the learner through programming step by step using example after example in conjunction with the software tape that comes with the book. Assembly language allows far greater speed and lets you pack more program into the memory space available. Working through the programs that continuously develop your understanding of machine code you will also greatly expand your knowledge of the VIC 20 and how it operates.

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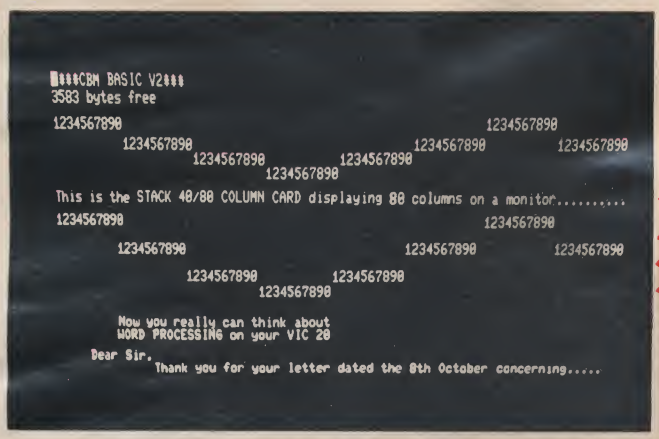

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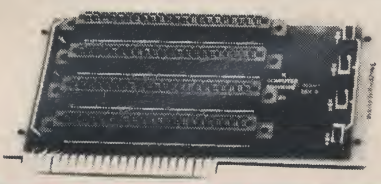

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