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A considerable amount of press attention has already been devoted to the topic of Sinclair Research's QL. The tenor started off 'good', then rapidly deteriorated to 'bad'; now it's floundering somewhere in the 'indifferent' league.

Unless you're a computer journalist — or somebody who's familiar with the world of microcomputers — it may not be altogether clear what's caused all the fuss. In a nutshell, the machine was launched with typical flair and razzamatazz on the 12th January of this year; production was to start at the end of that month, and delivery to customers (as ever, through Sinclair's mail-order system) some 28 days thereafter. But there were delays, and (still are) hardware and software problems; the first customer units weren't despatched until the beginning of May.

But as much as I'm a born cynic, sceptic and member of the "I'll believe it when I see it" school, now that I've seen it both in pre- and initial production form, I actually tend to believe it. Admittedly I haven't seen the final production version, but that's largely irrelevant. It's still a 'good thing' and can only get better. Of course it's not perfect — but how many new products are?

So why all the fuss? Is it because Sinclair is perhaps using the money received to bolster its annual accounts (as has been suggested by some) prior to its public flotation later this year? Is it because Sinclair is 'ripping off' the public? (Another claim levelled by some.) Or is it because the QL is not the product the pundits expected or wanted? I leave it to others more qualified than I to pronounce on the first two questions. The third can be examined here and now.

No sooner had rumours of a new Sinclair product started making the rounds late last year, then the cogniscenti were predicting its specification. It would, the pundits said, be a professional business microcomputer for the executive, including disk (either 5½-inch floppy or the smaller microfloppy) and a proprietary 16-bit operating system using either a Z80 or 68000 processor. But ... when it was announced we saw a professional-ish business machine using the trimmed 68008 processor, two built-in Microdrives, a non-standard operating system (QDOS), a new programming language (SuperBasic) and four Psiondeveloped business packages with 128K as standard.

Confounded in their predictions, the soothsayers saw attack as the best means of defence and the device came under carping criticism almost immediately. Nobody in his or her right mind would want a machine without disk, now would they? Surely, CP/M or MS DOS is a prerequisite of any business system? The Microdrives have been proven (on the Spectrum) to be finnicky and woefully unreliable, as well as slow — certainly this must be another mistake. And what, they asked, happened to the *real* typewriter quality keyboard? All in all, the QL's end of launch report was underlined 'Must try harder' and the product consigned verbally to the white elephant bin.

I can't find myself ascribing to all — if indeed any — of the pundits' barbs. Admittedly there is a large supply of business packages around for both CP/M and MS DOS systems, and it's perfectly clear that software availability is the first hurdle any new computer has to clear to stand any chance of success. But most business users will want to perform tasks that call for either a wordprocessor, a database, a spreadsheet or graphics package — and the QL comes supplied with just that selection. Of course, over and above such common requirements lies a vast plethora of more specialised tasks — payroll, accounting, stock control and so on; it remains to be seen whether the enthusiasm of the software houses will raise sufficiently to meet it.

I would be the last to suggest that the QL is the answer to every business person's personal computing dreams. It was prematurely announced, it has suffered design changes and the waiting list is enormous (March orders are expected to be fulfilled in July). The software still needs tidying up, the manuals still need to be delivered to existing customers and the Microdrives need to be seen to be reliable. But for all that, it is innovative, it is pitched correctly and it will sell in quantity.

**Nigel Cross** 

### **OUT IN FRONT**

Welcome to the first ever 'stand alone' edition of *QL User* — the magazine for users, and potential users, of the Sinclair *QL*. Those of you with Sinclair Spectrums will probably have been following our fortunes within the pages of *Your Spectrum*; well, feedback from there has shown a widespread desire to know more — so here we are!

### **FROM EVERY ANGLE**

The QL is not without its critics (and neither, I suspect, will be QL User!). There are those who feel the machine's premature release will have dented its public image beyond repair; others believe the promises outweigh the present difficulties. QL User has room for all, weaving together the myriad strands of QL opinion and balancing them against a background of expert knowledge and experience. Long time commentator, Henry Budgett, gives comprehensive advice to potential customers of the QL on the thorny subject of matching machine with owner and application. How *does* the QL stand up against its rivals? Let Henry take some of the chore out of choosing. And those wanting to delve further into the QL's silicon secrets will welcome insights into the 68008 processor chip — courtesy of Stephen Adams (on machine code) and Simon Goodwin who looks at the philosophy and heritage that accompany this controversial CPU chip.

Programmers will want to read Andrew Pennell's treatise on SuperBasic and his complete, explanatory chart of keywords (correcting many of the language errors that at present appear in the manual). Max Phillips leads the 'user view' charge, bubbling his way to the top of a seething cauldron of QL opinion. And for all inveterate key-tappers, there's QL Quest, an adventure in SuperBasic by Peter Shaw.

### **DON'T STOP NOW**

Issues of Your Spectrum will continue to feature QL User within their pages —until we've launched ourselves as a completely independent publication in a few months' time. Until then, carry on reading about developments as they occur — the latest delivery times, changes to SuperBasic, bugs we have found (and, wherever possible, cured) — all in the monthly pages of Your Spectrum.

### AND FINALLY ....

It's taken more than sheer hard work to put together this edition of *QL User*; we needed machines too (some other writers/editors, please note!). All of us on the team would like to thank Sinclair Research for helping as best they could, under clearly very difficult circumstances.

## THE COMPLETE QUANTUM LEAP BENCHTEST

The launch of the QL represents Sinclair's attempt at logical progression into the business computing sector. However, the company's failure to honour its 28-day delivery promise has brought widespread criticism but, ironically, given the QL a lot of 'free' publicity. Is it worth the wait? David Tebbutt got hold of the first working model and reports his conclusions.

Was I the only person in the world who wondered what all the fuss was about when the QL was launched? People kept on about the Motorola 68008 processor and the 128K of memory, not to mention the souped-up version of Basic. Multi-tasking and windows were fired verbally in my direction in a generous attempt to win me round, but still everything failed. No matter what, I could not get enthusiastic about the QL.

The responses warmed a little when I read the descriptions of Psion's bundle of four programs — Archive, Easel, Quill and Abacus; on paper at least they seemed to compare very favourably with many of the commercially available packages. But still there were doubts; after all, how can anyone do anything 'serious' with a Microdrive?

It wasn't until I'd clocked up many hours of QL use that I suddenly twigged whatit wasall about. Like lap-helds and the Macintosh, the QL has been designed for serious personal use. The supplied applications are just what the professional user needs to get started. Of course the built-in SuperBasic will appeal to the enthusiast too, but I suspect the bulk of QL sales will be to people who would like a business computer but cannot afford the cost normally associated with such a desirable device.

The QL costs nearly £400 including

The Sinclair QL Benchtest is reproduced from the June 1984 edition of Personal Computer World magazine — with kind permission of Computing Publications Ltd. VAT but you'll also need a printer, which will add at least another £250; so those using an existing television will be ready to go for £650. In fact, I strongly advise buying a monitor if you plan to use the QL for hours at a time. This might cost another £250, so you still get away with a computing facility for less than £1000.

The main psychological difference between the QL and its rivals is that Sinclair's device is only available by mail order at present. With the lap-helds and the Macintosh you can go into your local dealer and beat someone round the head if anything goes wrong. Not so with the QL. There is a thing called the QLUB which, for £35 per annum, entitles you to a newsletter and software enhancements. (Common bugs are fixed for nothing, according to Sinclair.) You can also send written queries about the software and these will be answered in writing (in due course, no doubt). What all this amounts to is that if things go wrong, or if you simply can't get the hang of something, sorry bud, you're on your own.

At the time of review there was still no sign of any QL shipments, although Sinclair was saying — with a degree of conviction — that the machines would start trickling out at the end of April (which indeed occurred. Ed). If this is the case, then I think they'll be going out with a few known holes in the firmware and with some sort of voucher scheme which will entitle buyers to an upgrade when Sinclair Research finalises the system.

At the moment the firmware is held in three 16K EPROMS, which has meant one of them occupying the ROM slot at the back of the machine. Early QLs will not run without this expansion ROM pack. Once the operating system is tucked away on real ROMs, the word is it'll fit inside the QL (on one 32K and one 16K ROM) and the ROM pack slot will be freed. Quite how the upgrade will take place, I have no idea. Presumably some sort of call-in system will be necessary because it's hard to see the average QL user taking the machine to bits to replace ROMs. It's also difficult to visualise people who have become dependent on the QL giving it up while the problem is sorted out. I suppose this latter group will stick with the expansion ROM until they find they need the slot for something else.

While the QL's availability is restricted to mail order alone, I would expect only those already familiar with computers to buy one. Of course this is a pretty hefty market these days so it's unlikely Sinclair will find itself short of





customers. Once QLs get into the shops and stores, then no doubt the computer naive people will be taking a serious look too.

### **Hardware Aspects**

A working QL comprises a keyboard with two integral Microdrives, a power supply, a television or monitor and its associated lead. Early versions will also need a ROM pack plugged in at the back (see earlier). An RS232C cable and a network cable are also supplied with the machine. If you do a lot of typing, you might find the keyboard lies a bit flat. To overcome this, Sinclair has supplied three funny little plastic feet which are supposed to fit into rubber pads under the keyboard. I found that these fell out regularly and in the end I dispensed with them and got used to a new typing position. On the plus side I found that the printer cable worked first time with my Epson MX 80F/T. However the network driver still hadn't been implemented in my version of the operating system, so attempts to talk to

my son's Spectrum were doomed to failure.

Just in case you were wondering about the QL's portability, Sinclair boasts that it weighs around three pounds. What it doesn't boast about is that the separate power supply weighs over two pounds! Also, you still need the television and, at eighteen or so inches wide, the QL cannot be slipped into a briefcase like its ZX predecessor.

But the QL has the sort of style the public has come to expect from Sinclair. The potential monotony of an all black rectangular casing is relieved by a textured surface and some ribbing on the right-hand side. The 65-key conventional QWERTY keyboard looks very neat, not at all unlike the NCR DMV. Despite the inevitable membrane mechanism underneath, the keyboard feels good and positive in operation. The Microdrives are hidden under the flat area over to the right.

The keyboard highlights the fact that we are not really looking at a traditional Sinclair machine. With its ESC key, five function keys, CTRL and ALT, it would seem to represent a veritable quantum leap by this company into the arms of convention. I must say I'm relieved. I felt immediately at home with the QL and found I could get on with the important business of using it for productive work. The '3' key has the hash sign above it, but don't despair; a pound sign is provided in the top right-hand corner next to a backslash key apparently it's vital when programming in C.

A yellow light at the front of the keyboard tells you when the machine is on and a red light in front of each Microdrive shows when it's in use. A row of slots under the Microdrives provides a degree of ventilation and also conceals a piezo-electric speaker. A covered expansion port on the right allows up to six Microdrives to be added. Incidentlly, these are not the same as the ZX Microdrives, although the blank tapes are identical.

The Spectrum and the QL actually format their tapes differently so, if you want to exchange information, you'll need to use the network. The Microdrive cartridges have an advertised minimum capacity of 85K and in theory theycantakeupto255 sectors, each of 512 bytes on a 200 feet tape loop. A reset key next to the Microdrive expansion port is an improvement on the ZX range which requires you to pull out the power supply lead to obtain the same effect.LiketheZXrange,thereisnoon/ off switch on the QL. The left-hand side of the keyboard has an enormous expansion port covered by a removable plate. This will be used for the promised 512K of add-on RAM. No doubt enterprising companies will invent all sorts of devices to plug in here.

Turning to the back of the keyboard, reading from left to right there are two network sockets, a miniature power socket, an 8-pin DIN socket for the monitor (monochrome or colour), UHF socket, two RS232C sockets, two joystick sockets and a slot with a removable cover for the ROM pack. This pack can hold up to 32K. The RS232C and the joystick sockets are like those newfangled telephone jack sockets. If one RS232C socket doesn't do what you want, you can try the other (which has its signalling pins reversed).

Removal of the 10 screws which hold the QL together reveals a very tidy interior. The main PCB is crowded, albeit neatly laid out. The large Motorola 68008 can be seen on the left, 16 chips make up the 128K RAM, two EPROMs contain the operating system and SuperBasic, and an extra 8049 processor controls the keyboard — among other things. Four Sinclair-designed ICs control the display, memory, RS-232C, network and Microdrives. Behind them is an enormous heat sink which nicely warms the flat panel to the right.

The keyboard is covered by an aluminium plate which, when removed, reveals the mechanism. The key presses down on a sort of moulded soft plastic dome that has a spike on its



### THE COMPLEAT BENCHTEST THE SINCLAIR QUANTUM LEAP

inside — and that in turn presses on a sheet of plastic printed with metallised tracks. This then presses on another (similar) sheet, thus completing an electrical connection between two tracks — one on each sheet. It sounds nasty but actually the system works very well. Once you appreciate how the keyboard functions, you can feel it in use — otherwise, I doubt most people would notice.

I used the QL with a domestic television and I must admit that it got a bit tiring after a while. Operating the machine with a monitor, the picture was a lot better with none of the irritating flicker inevitable with UHF. The computer display wraps off the corners of the television screen, another reason why a monitor may be preferable. On the other hand, it is possible to select from a variety of character sizes and display resolutions — which can reduce the problems somewhat. Psion gives users a choice of 80-, 64- and 40column displays for its programs. For me, the 64-column displayworked very well and I soon found myself using it all the time.

Overall, I was very pleased with the quality of the QL hardware; it behaved faultlessly the whole time I had it.

### **Software Analysis**

To repeat, the operating system and the Basic were not finished on the machine I tested. They were, however, complete in most of the important respects.

The Basic is a very powerful language that offers some additional structures over and above the earlier ZX Basics. Particularly impressive is the ability to define extensions to the language using the procedure definition



facilities. One current limitation in SuperBasic restricts overall program size to 32K. This is to do with the internalerrorchecking. Sinclair tells methat this restriction will be lifted in due course.

The other major omission in the review machine's Basic was the full screen editor promised at launch. At the time of writing, the only way to edit a line of Basic is to re-enter it.

That's all the bad news; now let's look at what's actually in the Basic and see perhaps why it has been christened SuperBasic.

The language follows a similar pattern to all Basic versions. I had few problems writing little routines and I know I shouldn't admit this but I must confess to having introduced a couple of GO TOs in my programs. SuperBasic doesn't mind: it just makes them a bit unnecessary. Anyway the point of this confession is that if you cannot say IF... THEN and aline number, you must say IF... THEN GO TO. Basic commands must be typed in full — there is no keyword entry system, although I suppose you could create your own using the procedure definition facilities.

AnAUTO line numbering system was missing on my copy but I have been assured that it will be included in the released version. This, coupled with a RENUMBER command, will lead to tidier programs. BAUD sets the baud rate of the two RS232C ports — yes, both of them must be set to the same speed (which can be one of eight between 75 and 19200 baud). 19200 is reserved for transmission only.

BEEP makes sounds through the grotty speaker and pitch and duration can be varied, as well as things like second pitch and bounce, which 'bounces' the sound between the two pitches. A fuzzy option adds a random number to the pitch on each cycle causing an appropriate distortion; that's fine for fun, but is not exactly of massive practical benefit. I hear that an external sound generator is under development, which should help.

The Basic contains an impressive range of graphics facilities, rather as you might expect, and windows, borders and blocks of colour can all be created on the 512 x 256 resolution screen. Up to four colours are available in this high resolution mode and the lower resolution mode ( $256 \times 256$ ) gives eight colours plus flashing.

**The MODE command lets you switch** between 256 and 512 screen widths. When you define the ink and paper colours, you can also define a stipple pattern but, unless you like shimmering, don't use it on a domestic TV. Character sizes can vary in width in four stages, from 6 to 16 bits wide and either 10 or 20 bits high. This would be useful in headings or in applications for young children or partially sighted people, for example. A PAN command allows you to slide the contents of a window sideways but once you've lost stuff from the window, you can't get it back without regenerating it.

Windows are handled by allocating each one a spare channel...then you simply address your Basic commands to the one chosen. It really is a doddle.

Now for the various control structures available in SuperBasic. Firstly there's DEF FN which is probably already familiar to you; it allows you to define a function which returns some sort of value to the line using it. It also allows you to use local variables through the LOCAL statement. These may have the same name as variables outside the function definition, but they will not become confused during execution of the program. DEF FN is terminated with END DEF. Similarly DEFine PROCedure is terminated with END def and it, too, allows local variables. Any parameters needed when defining the procedure are placed in brackets; for example, F 23. You can do some super things with this facility and, of course, it does away with GOSUBs and the complications of parameter passing.

And that's not all. The old familiar FOR...NEXT has a new twist. It allows you to slip some commands after the NEXT but before the END. REPeat gives you a repeating loop, from which you escape via an EXIT command embedded somewhere in the structure. Perhaps you need to wait until an input satisfies a test before moving on. Once again this is an attempt by Sinclair to encourage GO TO-less programming.

The final structure I'd like to mention is SELect. Used with ON this gives a similar effect to ON ... GO TO but here you can embed all the actions inside the procedure itself. For example, SELect ON A can be followed by ON A=1 and then all the things you want to happen if A=1. The next ON will simulate a new set of actions for a second value of A. This command ends with END SELect. Very neat.

SuperBasic has an interesting feature which Sinclair calls 'coercion'. This allows you to mix your variables when performing calculations. For example, it will let you add '2' to '2' and still get '4'.

Finally, the Benchmark timings. These put the QL in the top third or so of all machines tested by PCW. Frankly, though, the comparative speed of the machines is rather incidental; it's far more important to take the broader view and decided how the facilities offered compare.

### **Qualities of QDOS**

The QL Operating system, QDOS, is busy working away in the background whenever the device is in use. It makes its presence known, for example, when you need to perform tasks in different windows and when you are transferring data to and from the Microdrives.

When the QL is first switched on, the screen is divided into three separate windows. The bottom few lines of the screen is a command entry and message display area where all the direct interactions with QDOS and Super-Basic take place. The top of the screen is then divided vertically, upper left being

## THE KLUDGE AND ITS CONNOTATIONS

One of the more unexpected surprises on earlier QLs is an ugly black plastic box that plugs into the ROM port. Affectionately known as the 'Kludge', it provides an extra 16K of **EPROM for SuperBasic** and QDOS. Sinclair discovered that it couldn't fit all the code into the 32K ROM space left on the board and had to make this rather crude extension.

The Kludge may have major implications for the QL. All early machines will have it and indeed many of those shipped to customers have had it packaged in this crude plastic case, despite Sinclair's insistance that it would be better presented. It is, in effect, an indispensible ROM cartridge. Since that rather monopolises the cartridge port, it's unlikely that QL cartridge software will appear for some little time.

This makes a major difference to the QL. Selling software on Microdrive is currently an expensive and risky business and will continue to be until such time as Sinclair can sell vastly more Microdrives than it's doing at present. ROM cartridges would have been very popular, not only because they can be done cheaper but because they provide an 'instant' load feature. Having your application ready when you switchon is a whole world different from the agonising one to two minutes you have to wait to load it off a Microdrive.

The second point is that, of the 64K of ROM space allocated in the system, 48K rather than 32K is now reserved for system use. Although Sinclair's now turned the Kiudge into a set of **ROMs** inside the machine, there's only 16K of space for cartridges. 68008 code is very bulky (as Sinclair itself has just learnt the hard way). So even without the Kludge, the



Max Phillips – momentarily startled by the appearence of a weird little beastie known as the Kludge.

cartridge port may prove too limited for serious applications cartridges. It's interesting, on a machine which can theoretically address over 1 Mb of memory, to meet such limits on the cartridge port.

Finally, the company has hit a sinister snag that should have been avoided. It would have been sensible to remember the old proverb: Give a programmer more time and space to finish things off and he'll start adding something new. In this case, the extra 16K to finish Basic and QDOS has tempted the QL team to add turtle graphics commands to the Basic. Question: why is the spec of the machine being altered 'for fun' so late when customer's orders (and money) are just piling up? Better question: why weren't such obvious things as turtle graphics commands included in the original spec?

Perhaps the only redeeming feature of the Kludge is that it is interchangeable. The QL is probably the only micro where the system firmware unplugs without opening the



Focus on the Kludge.

case and ruining your guarantee! Early QLs have shown vast numbers of dangerous bugs that make even the first BBC Micros and Orics (and they were pretty awful) seem usable. As these emerged (Yellow Pages slogan: let your users do the testing!), it first seemed they would provide a second version of the Kludge - to trap and patch as many of the problems as possible. There was even a spare 16K of space on the cartridge board if needed. However, Sinclair decided to take advantage of a supply of 32K EPROMs and bring it all back inside. Quicker than expected, the Kludge was gone.

Five function keys are incorporated on the lefthand side of the keyboard – a move away from the less conventional keyboard of the Spectrum to something of a more professional 'standard'.

The Kludge – a 32K EPROM circuit board containing the missing 16K of the operating system and SuperBasic. It has to be located in the ROM cartridge slot in order for the QL (in its present condition) to be operational. Sinclair spotters might be interested to know that the Kludge supplied with the office machine was by no means the first version – which leads one to speculate that the problem has been known about for some considerable time.

These two 16K EPROMs, along with the Kludge, hold the QL firmware – for instance the operating, system (QDOS) and Super-Basic. What has happened is that one of these 16K devices will be replaced with a 32K EPROM and the Kludge will be no more.

> Plastic feet help prop the QL up to something like a comfortable typing angle; they fit into recesses in the base. Unfortunately, they also seem to fall out again and you may be better off using an old book or manual.

> > This is a removable plastic plate which can be relegated to the bin once the half Megabyte extension RAM board becomes more than a twinkle in Sir Clive's eye.

The expansion port for the half Megabyte extension RAM board, which will expand the internal memory to 640K. Reliable sources claim that this is unlikely to happen for a very long time indeed.

> The QL's main processor – the 7.5MHz Motorola 68008. It was the butt of much 'is it or isn't it 32-bit' controversy in the early days of the machine.

The custom gate array chip.

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16 RAM chips comprise the QL's 128K of internal RAM, 32K of which is used to create the display.

> The connectors that attach the keyboard to the main circuit board.

> > Underneath the Microdrive area, there's a row of slots which provide ventilation for a hidden piezo-electric speaker. In actual use, the noise produced is little better than the Spectrum's BEEP function but Sinclair Research is working to develop a better sound generator; so, no doubt, will be the ever-attentive support industry.

### **INS AND OUTS OF THE QL**

The innards of the QL may look a lot neater than past computers from the Sinclair Research stable — but all they've done is make their mistakes look more professional; instead of patch-ups and cut lines on a PCB board, on the model shown (FB) there's 16K hanging out the back! The QL's full-size QWERTY keyboard layout includes a Space Bar, left- and righthand Shift keys and four separate cursor control keys. An audible click accompanies a key making contact, and a membrane beneath the keyboard protects the circuit board from dust, etc.

With only the ZX80 straying from the usual sombre Sinclair Research colour code (remember the black watches?), the QL remains respendently black. There is some ribbing on the right-hand side – perhaps it's time to design the 'QL coffee cup' with a bottom that slots into the grooves.

These are the slots through which you insert cartridges into the built-in twin Microdrives.

The UHF modulator unit which outputs to the TV port.

A reset button, which enables the computer to be cleared without any need to 'pull the plug' – as was necessary on the Spectrum. On reset, the screen performs a psychedelic scroll and flicks back into action, offering you the choice of using a TV or monitor.

This is a heat sink; left off the previous pre-production versions of the QL, perhaps it's an indication that things have hotted up since it was announced!

The quartz crystal device which generates the clock.

An extension slot allowing up to six further QL Microdrives to be attached to the system. However, like the ZX Microdrives, only one device can be used at a time; they won't provide the storage advantage afforded by a floppy disk drive or the like.

The ribbon connectors that attach the Microdrive units to the circuit board.

The Intel 8049 chip, which controls the keyboard, generates the sound and acts as an R\$232C receiver.

Two built-in QL Microdrives, each able to contain a cartridge which can store up to 100K of data with an average access time of 3.5 seconds. Two slots are provided on the front of the QL which allow the cartridges to be inserted.

A QL Microdrive cartridge, in appearance very much like its ZX predecessors except that these run faster and hold more data – up to 100K.

in and

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ENTER

SHIFT

ALT



### THE COMPLEAT BENCHTEST THE SINCLAIR QUANTUM LEAP

used to show the developing Basic program and upper right displaying the user view of the program when you run it. The bottom of the screen is attached to channel 0, the listing area to channel 2 and the program execution area to channel 1. It's a simple matter to direct commands to the appropriate channel.

QDOS handles multi-tasking by dividing processing time between the various jobs being executed, and according to their built-in priorities. To repeat, I wasn't able to set up an adequate test system to see how this performed. What I do know is that at the launch it was less than impressive. The fact is that the QL *can* do several things at once, but the performance depends more on the quality of the programs running than on the inherent capability of the operating system.

As you may have guessed from the channel numbers, all I/O is deviceindependent. You simply choose your channel, attach your device to it by saying something arcane like OPEN £5; CON\_200x200a50x50\_ and you have created a 200 x 200 bit window starting at location 50 x 50 and with a keyboard buffer of 32 characters. Easy isn't it?

The really annoying thing about QDOS for me was that I had to put an underline at the end of my Microdrive commands. For example 'DIV MDVI' does not give a directory of Microdrive 1, whereas 'DIR MDVI\_' does.

### **Applications Software**

Without doubt, the Psion programs tip the scales heavily in favour of the QL when you compare it with other systems. Four packages are provided wordprocessor, database system, spreadsheet program and business graphics — and I used all of them to a



limited extent.

Easel was the largest and most complicated to program, yet it appears to the user as the most trivial and easiest to use. It's great for bringing numbers to life. At the simplest level you can literally load the program and start keying in numbers and immediately a histogram appears on the screen. If you go off the scale it automatically rescales itself and lets you carry on. If you want to enter another set of figures, simply choose a new name and start keying.

Let's say the first lot were called 'TURNOVER' and the second, 'COSTS'. You can easily create a third set by saying'MARGIN=TURNOVER-COSTS'. These can then be displayed individually as histograms, line graphs or pie charts, or they can be superimposed on each other to show the relationships between differing sets of figures. Text can be added to the charts, and moved around, and everything can be printed provided, of course, your printer is capable of graphics.

You can read in files which have been prepared either by Abacus (the spreadsheet) or by Archive (the database). Such data will be displayed according to the currently selected format and it can be transmitted from this program to others in the form of tables of numbers.

Deeperinside the package there are facilities to manipulate text, open windows, vary column widths and transfer data to other Psion programs.

Quill (the wordprocessor) seems to have very grown-up facilities. I particularly like the fact that what you see on the screen is what gets printed out. Supercripts and subscripts are handledbyQuill'sbuilt-inspecialcharacter set. Underline, an inherent feature of the QL, is also used to good effect.

Another thing that impressed me was the fact that the current character position is shown by a highlight on the margin rulerat the top of the screen. Quill keeps a word count as you go along, something many professional writers will find invaluable.

I spent considerably more time on Archive than on the other three - partly because it seemed such a very 'deep' product. A novice can use it literally like a card file and be none the wiser after months; others will find that they prefer to use a special screen layout rather than the default. And then again, some people will want to build some sort of system around Archive. All these things are possible within the one product.

I started by simply listing the fields into which I wanted to enter data and then creating a simple file of names and addresses. That was easy-it took about 10 minutes. Then I got ambitious and started entering data which exceeded the available space for its entry. The datawasaccepted, although it actually ruined the display. Archive will accept variable length data up to 255 characters per field. In this respect it shows similar limitations to other popular databases.

Since the QL has no character grap-

### **QLON SPEC**

Specifications provided by a computer's manufacturer have a nasty habit of sounding like a foreign language. So here they are for the QL ... in English!

### CPU — Central Processing Unit

Here we have the heart of the machine, the chip (68008) which allows **QDOS** and SuperBasic to operate. It was also the butt of many a 'call this a 32-bit chip' joke back in January. At the launch, Sir Clive was heard to remark that "we waited for the 32bit chip to get the extra memory needless to say, the 68008 only addresses one Megabyte of memory (unlike its kith and kin in the 68000 series which address 16 Megabytes) which is exactly the same as any good 16-bitter. The Intel 8049 controls the keyboard, generates the sound and acts as an RS232C receiver.

### CPU

7.5MHz Motorola 68008 plus Intel 8049

### RAM

128K (32K used by display). Expansion to 640K coming

RO 48K QDOS and SuperBasic. 32K ROM pack (see review)

### DISPLAY

512 x 256 four colour. 256 x 256 eight colour. UHF or RGB

### KEYBOARD

65-key, normal gwerty plus five function and cursor

### MICRODRIVES

Two drives, min. 100K each, Can expand with further six

Two RS232. Two joystick. Two network

### LANGUAGES

**SuperBasic** 

### APPLICATIONS

Quill - Wordprocessor Abacus — Spreadsheet Easel — Business graphics Archive --- Database

### **Applications**

The list of packages that come supplied with the machine. All are presented on Microdrive, although plans may be afoot to convert them to ROM cartridge — which would free more of the available memory for the user. All are detailed comprehensively in the manual that comes with the QL, although the programs are written in such a way as to allow the first-time user to quickly find his or her way around.

### RAM — Random Access Memory

This is the short-term memory of the QL which holds things like the screen display and your programs. The entire contents of RAM are lost when you press the Reset button. An expansion of the 128K of RAM is planned, via an extension board which is designed to hang out of the left-hand side of the machine; this will add a further 0.5 Megabyte of RAM. However, since the January launch, little has been heard on this addition; watch this space when the rest of the machine has been finished and people suddenly wake up to the fact that the area of RAM expansion is still clouded by silence.

**Display** An indication of the height of resolution available on the QL, in four-colour and eight-colour mode. Display is available via professional monitors and home TVs, a port being provided for each at the back of the machine.

### **Microdrives**

The QL's answer to disk drives — two built-in units are included with an option of attaching a further six. With an average access time of 3.5 seconds, each Microdrive cartridge is capable of storing up to 100K of data. As the QL has no immediate output to allow for floppy disk drive, this is all you've got unless you want to upgrade the device with a hard disk. With Microdrives this may present problems of storage - that is, up to 50 cartridges to cope with a single disk!

I/O — Input/Output A measure of the QL's capabilities for linking to other computers and peripherals. Of the options provided, the joystick ports seem the most useless especially for a machine that's being promoted as purely for 'business' perhaps something more useful (like a mouse) may be developed in the future. The omission of floppy disk and cassette ports will be badly felt until the support industry gets itself in gear.

QL's permanent memory, whose contents are retained even when the machine is switched off. At first, QDOS and SuperBasic — both essential ROM items were held in three 16K EPROMs, two internally and one externally (on the Kludge). Sinclair then replaced one of the 16K EPROMs with a 32K device, brought it all inside. and left users with a free ROM cartridge port.

ROM - Read Only Memory

Details of the area of the

### **Keyboard**

This gives an indication of the qualities you can expect from the keyboard. The QL works on a membrane system where the plastic keys press down to make the vital connections - useful if you're especially clumsy with the coffee. The traditional Sinclair Research 'keyword' system has, thankfully been dropped from the QL.

### Languages.

This is the on-board language supplied with the QL, modestly entitled SuperBasic. Completely different from ZX Basic, the new language allows strings of up to 32K facilities for multi-tasking (which means you can run several processes at the same time) and the ability to handle a unique range of numbers from  $-10^{-165}$  to  $10^{615}$ . Future developments from Sinclair Research are said to include a version of Prolog and a C compiler

### THE COMPLEAT BENCHTEST THE SINCLAIR QUANTUM LEAP

hics, the design of records is achieved with judicious use of the exclamation mark and the hyphen. The end result is usable, but looks a little tacky. Bearing in mind the sort of program size and timescale limitations Psion was working to, I think this is a small price to pay for the power and usefulness of the product.

It's possible to quickly locate records in a file by using the search or locate commands. The first ignores case and the second matches exactly. A sort is built into *Archive* and it works on the straight ASCII sequence. This means that 'Computer' would come before 'all' for example.

As with SuperBasic you can define procedures within Archive, and the

potential for developing applications and new commands is mind-blowing. Suddenly the entire product becomes soft and you can redefine it to suit your needs exactly. For example, do you always open the samefiles, display them in the same form and then access a particular record? Fine. there's no reason why that shouldn't all be done with two keystrokes — G and ENTER, perhaps. I chose 'G' for 'Go'. There's a lot of power in this package and it really will repay those prepared to give it some diligent study.

All the Psion packages have plain English commands, although this does make them a little long-winded at times, and they all have extensive help facilities which can be called up at any stage. Psion is about to launch its products on to other machines and I reckon this is an excellent marketing ploy.

People who become used to using Psion programs on the QL will feel much

### **BENCHMARK TIMINGS**

One of the prime requirements of any computer system is speed. Computers, after all, don't do anything which can't be done manually — they just do it faster. Benchmark programs are one way of assessing the speed of a computer.

A Benchmark program is simply a routine which the computer executes a set number of times; the time taken to complete the program is recorded and compared with other machines. These timings are referred to as Benchmarks.

Although Benchmarks

can give some indication of the speed of a computer, they should always be taken with a large pinch of salt. The Benchmark programs give a fairly accurate idea of the speed of a computer at executing a typical Basic program. In general usage, however, all sorts of other factors must also be considered - disk access, screen handling and so on. And speed is by no means the only factor to be considered when choosing a computer. But if speed is important to you, the Benchmark timings will give you some idea of how the QL

performs. By way of comparison, the December 1983 edition of *Personal Computer World* offers a complete listing of Benchmark timings derived from all the machines the magazine has tested so far.

Benchmark timings for the QL are compared here against those . measured for a range of (generally more expensive) machines that are pitched within the personal/business environment. All timings appeared first in *Personal Computer World* magazine.

COM	PARI	SO	N OF	BE	NC	IMA	RK	S	
	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
ACT Apricot	1.6	5.2	10.6	11.0	12.4	22.9	35.4	34.4	16.7
ACT Sirius	1.8	5.3	10.7	11.1	12.9	24.2	37.1	27.9	16.4
Apple 2	1.3	8.5	16.0	17.8	19.1	28.6	44.8	107.0	30.4
Apple 3	1.7	7.2	13.5	14.5	16.0	27.0	42.5	75.0	24.7
BBC Micro	1.0	3.1	8.2	8.7	9.1	13.9	21.4	51.0	14.6
IBM PC	1.5	5.2	12.1	12.6	13.6	23.5	37.4	35.0	17.6
NCR Decision Mate V	1.6	4.8	12.8	12.8	13.7	24.3	38.5	69.0	22.2
Olivetti M20	1.3	4.0	8.1	8.5	9.6	17.4	26.7	16.0	11.5
Osborne 01	1.4	4.4	11.7	11.6	12.3	21.9	34.9	61.0	19.9
Sinclair QL	2.1	6.4	10.7	10.3	13.2	26.1	61.8	25.8	19.6
Wren	1.2	3.1	7.6	7.5	8.4	15.3	23.8	3.9	8.9

**BM1:** This is a simple FOR-NEXT loop. **BM2:** A counter-controlled loop. This is inherently slower than a FOR-NEXT loop, involving a conditional branch in line 140. **BM3:** A test of the speed at arithmetic using variables. **BM4:** A test of the speed at arithmetic using constants. **BM5:** As Benchmark 4, but with the addition of a jump to a subroutine. **BM6:** As Benchmark 5, but dimensions a five-element array in line 130, and with the addition of an empty FOR-NEXT loop. **BM7:** As Benchmark 6, but fills the five-element array. **BM8:** A test of the speed at calculating complex mathematical functions.

happier if they also use them on their 'real' machines at work. Conversely, people who use Psion on their 'real' machines may want to buy a QL because they've already learned what Psion's products can do.

### Standard Of Documentation

I was provided with preliminary documentation which looked adequate enough. And although there was no beginner'sguide, I understand that this will be available in the final version.

A Basic keyboard summary is provided which explains every Basic instruction in detail; another section runs through all QL concepts which fall outside the scope of the Basic keywords section. And each of the application packages has its own guide — providing both tutorial and reference material. Inevitably with such a preliminary document, there were many discrepancies between the manual and the products I was using. Structurally, the documentation is fine and I trust the errors will be put right before the final version is issued.

### What It Costs

The price of the QL is £399 including VAT. To this you will need to add the cost of a three-pin plug and a monitor plug (for those wanting to improve on TV output).

At press time Sinclair claimed that deliveries of the machine would start at the end of April. The fact is that in mid-April I had an almost-working machine and set of software. If the QLs do go out soon, then I think it is certain that they will have an extension ROM sticking out the back with software upgrades promised under some sort of voucher scheme. Not the happiest state of affairs.

### **The Verdict**

There's no doubt that the QL is a wellmade piece of hardware. The operating system, the applications and the Basic look very good on paper. The review machine was still short of a few facilities and this either means that deliveries will start soon and early buyers will need some sort of upgrade, or that the project is going to be delayed further while the software is completed.

If everything were in place, then I would consider this machine very seriously as a truly personal computer, but not as something to run a business on. The Psion spreadsheet, database, business graphics and wordprocessing packages, coupled with the limited Microdrive capacity, define the market very clearly. The Psion programs look very good in terms of the ranges and quality of facilities offered.

The bottom line is that the QL gives you the potential to own a complete and serious computing facility, including printer and essential software, for under £1000. The figure drops to well under that if you're prepared to use a domestic TV rather than a monitor for the display.

# SPEAKING FOR MYSELF

Halfway between the strict confines of the 'official' Benchtest and the cheap commentary of the popular press lies the fertile plain of the considered personal view. (Max Phillips) and others opinionises on the pitfalls and pleasures of owning a QL.

It's only recently that the full extent of the QL debacle has really emerged and, predictably, the cynics are telling usit's full of mistakes and bugs, that this or that doesn't work, and that it won't sell without such and such. But where these paper pundits fail so miserably is to see beyond the disastrous launch, forward into the machine's promising future. So let's put everything into better context. The QL will be a great machine and it's just that a ridiculously early launch has put an unfinished product into the hands of some customers and piles of orders (and money) into the hands of the manufacturer. In many ways, if you haven't got your machine yet, you're lucky. Users of early QLs have a lot of heartache to go through.

Using a real QL has so far been something of disappointment; it still brings back strong memories of the occasional times I was allowed to use early pre-production models. Many of the things that I thought were wrong, but was prepared to forgive because it was an early machine, are still wrong. What'sworse, once you get to work on a QL for a longer period of time, you keep finding more things wrong. At the moment the machine really is a hacker's dream. It's like a rather expensive game - a vast adventure where you and your rival owners spend hour upon hour trying to find ever more disastrous bugs.

Allinal, the QL has lost a great deal of its credibility long before it's been allowed a sensible chance; it's going to take a lot of work to restore that. Fortunately, the QL is one of the few micros around good enough to meet that challenge.

Few would deny that the machine is a delight to look at and use. Its small size and convenient shape make it a comfortable companion — on desktop or in carrier bag! The only major problem with the casing seems to be that the three plastic feet (which tip the machine to a suitable typing angle) have a habit of falling off.

The other odd feature of the case is the now infamous Kludge that plugs intothe ROM cartridge port (see the QL Benchtest). It's a 16K EPROM and contains the remaining bits of QDOS and SuperBasic that couldn't be made to fit into the 32K of ROM space in the machine. Funnily enough, although it's the most obvious visible sign of the mess that the QL has got into, it's also the machine's possible saviour. Because the Kludge is interchangeable, when Sinclair *does* produce a fixed version of its code it has the opportunity to upgrade users without them having to return — or even open — their machines.

On the minus side, the Kludge firmly ties up the cartridge port, preventing development of all-important cartridge

"The QL is a great machine. It's just that a ridiculously early launch has put an unfinished product into the hands of some customers and those users will have a lot of heartache to go through."

software. Even when the Kludge has vanished and its code has been placed on ROMs inside the case, it'll continue to have a bad effect. There's 64K ROM space in a QL, 32K of which was for the system ROM. Now there's 48K of system ROM and a rather restrictive 16K of space for cartridge-based programs.

It's a corner that has been cut rather too closely. The QL has a vast excess of memory capacity (up to 1 Mb) and, compared to serious business micros, a very slow mass storage system consisting of just the two Microdrives. It would have made more sense to pro vide a machine where you could go on plugging in ROM cartridges almost adinfinitum, and where users could switch to the one they wanted, when they wanted.

### **Fingers To The Board**

The keyboard is a bit strange at first—it does have fully moving keys but underneath it's the same old 'rubber mat' system used on the Spectrum and ZX81. Other manufacturers are also taking this route — both Advance and Flan Computers (the Enterprise) reckon to have usable keyboards based on this technique. On the QL it works admirably and with a bit of practice, you can get up a fair old speed. Best of all, the QL has a proper type-ahead system, so it never drops a keypress.

The layout itself can only be described as copious. Every key you could reasonably want is there, with the important exception of a Backspace; Sinclair has seen fit to leave out this rather essential key. A complete set of editing keys have been built into the arrow, Control and Alt keys, and Backspace is infactControlandLeftArrow.Youguickly get used to this although, unfortunately, it's not available throughout all of the Psion packages and therefore continues to be a source of frustration.

The QL doesn't run to the expense of an on/off switch — so use the wall switch to avoid the wear and tear of yanking out plugs and sockets by the lead. The first thing it does on power-up is ask whether you're using a TV or monitor. This is purely for aesthetics; some TVs won't handle the QL's 80column output and will have to use 64 or 40 instead. This isn't so bad as the Psion packages adapt remarkably well to the different screen widths.

The quality of the display seems to vary considerably from QL to QL. Most of the time it's surprisingly good and you can get some QL/TV combinations to provide a really good 80 columns. You also get systems which lose the left and right-hand edge of the screen, and even the colour signal.

Most people seem to have overlooked the rather impressive display specification of the QL. It's a pure bitmapped display operating at a resolution of 512x200 dots (80x24 text) in OPINIONS

### SPEAKING FOR MYSELF

four colours or 256x200 dots (40x24 text) in eight colours. The QDOS software uses the eight colours to provide a total of 256 different stipples.

Sinclair has built some clever screen handling software into the QL, the most well known of which is the so-called 'windowing' system. This is little more than a potentially useful screen handling gimmick. Each window is a set of four margins — a top left, a PAPER and INK colour and so on. It's associated with a particular I/O channel so that screen handling commands can be sent specifically to it.

The result can be made to look like windows, although they have no contents as such and you can't close and open them with stuff inside. If you overlap them, you simply destroy what's underneath. PAN and SCROLL move the area of the window in any of four directions, but you lose information which you PAN or SCROLL off the edge. Used carefully, the windows can produce some stunning effects. Don't, however, associate them with the term windowing as used in context of machines like the Apple Macintosh and programs such as *VisiOn*.

Anyone technically minded enough will quickly realise that the majority of the QL's screen handling, like the windows, is done in software. The character generator, for example, which allows the same set of character definitions to be displayed in eight different sizes is again a rather smart piece of code. This approach is very flexible but rather slow.

Both games and serious programs will be slowed down by the lack of hardware facilities for writing to the screen. For that matter, the screen memory itself is part of the system's main memory and the processor and display circuitry must share it between them. As a result, the processor is probably slower than it should be because it has to wait for the display circuitry.

It seems that the QL suffers either from over ambition or chronic confusion. If it's to be a cheap business micro, then anyone else would have designed it with a fast monochrome display system. Maybe Sinclair went to all the trouble of colour and very hi-res bit-mapped graphics just to let the machine play games.

### **Drive On, Sir Clive**

The biggest area of controversy is, of course, the Microdrive system of storage. Everyone had expected the QL to have a single disk as most people still see the Microdrives as too slow and unreliable for serious use. But the fact is I actually see the drives as the machine's best feature.

Having any kind of fast mass storage transforms a home computer. No-one



Max Phillips: The longer you look, the more you find that's wrong; it's like a hacker's dream.

will suggest that the Microdrives are quick, but they aren't as slow as some people say either. Sometimes, if you happen to be in the right place, the drives will have loaded a short program almost before you've had time to look up at the screen. Sometimes they get fussy and you seem to sit for hours and hours. The QL Microdrives are distinctly better than their Spectrum counterparts - they operate faster and QDOS has a proper RAM-based directory, unlike the Spectrum. A slave processor looks after the drives so you do get some interesting time savers; it verifies tape-writes in the background, for example, while you get on with something else.

The media itself is a delightful size but its delicacy is always in question. The QL occasionally hangs while repeatedly attempting to read a tape; it doesn't just try a set number of times and then surrender. Often the only way out of the *impasse* is to pull out a running cartridge—something which they seem to survive rather well. QDOS also names cartridges so that it always knows when a cartridge has been swapped. This sensibly prevents the RAM-based directory getting out of sync with the tape actually in use.

The real problem with the Microdrives is the ridiculous cost of cartridges; at £4.95 each that's more than a good quality floppy. But software houses are now firmly stuck with Microdrives as the distribution medium for their products — because for some bizarre reason, the QL has no cassette interface and, of course, the cartridge port is now firmly occupied.

So software houses will have to charge a lot for their Microdrive pro-

ducts — which doesn't encourage people to buy programs and doesn't encourage software houses to produce them. It's a common enough vicious circle... Sinclair may not be able to drop the price of cartridges until it's selling a lot more, and it isn't going to do that until they are a lot cheaper. Houses would also prefer not to be buying their media from a single supplier, even if it's from the machine's manufacturer.

The Microdrives are at once a curse and a blessing. They are extremely good value for money and a terrific improvement over cassette... but they should not be there without a cassette interface.

### **Problems In Every Port**

The more disappointing aspects of the QL are to be found lurking around the back. There's no Centronics port, a dreadful but increasingly common omission; instead, there are two poorly implemented serial ports. These have modern telephone jacks which, although trendy, aesthetic and (let's face it) secure, are hardly easy to come by and nigh on impossible to wire up yourself.

Sinclair's token free-gift for those who've already ordered is, of course, one of these rare RS232 leads, which Sinclair has conveniently valued at £14.95. If you're going to use such daft connections, the lead ought to be there in the box, value £0!

More of a problem, the two serial ports have to be set to the same baud rate, and that rate applies to both received and transmitted data. It's not a problem until you try to access Micronet, or drive both a modem and a printer. There is a chance that software could be written to squeeze other settings out of the system, but it seems rather foolish for it not to be there already.

Then there is the network, which is openly not much more sophisticated than the ZX Interface 1 network available on the Spectrum. Sinclair admits to problems with a mix of Spectrums and QLs on the net, but the arrangement does work for a set of QLs. However, the network is still principally just a serial link. For the most part, it's a question of two people stopping what theyaredoingandnegotiatingthedata transfer every step of the way. For the inexperienced, it's probably quicker to pass the other guy a Microdrive cartridge. Of course, given the claimed facilities of QDOS and the power of the 68008, a more sensible network should be possible.

### Glam Basic — Juicy But Slow

SuperBasic is probably the most important piece of software in the QL; it really shouldn't be, but at the moment the machine is only suitable for dedicated hackers and Basic is the place they'll want to start. It's a shame then that it seems to be the worst off in terms of bugs.

It's a glamour Basic with a number of

juicyfeatures, but it misses a vital point. What counts with Basic is speed — it's habitually used for stuff like games and it needs to be able to tear its way through a program. SuperBasic offers a somewhat more majestic pace — and a lot of capabilities (such as ridiculously over-sized ranges for floating point numbers) that people just aren't going to use.

It's also got a lot of the academic in it, sporting long, cumbersome commands and short, often inappropriate error messages. The latter seem to stem from use of a set of predefined and necessarily rather vague messages provided by QDOS. Why application programs (even the Basic) can't have their own error messages seems so stupid as to be hardly even worthy of investigation.

SuperBasic has all the makings of a grown up language; multi-line functions and procedures, formatted listings and so on. Procedures can be called from outside a running program, and given that you can also pass parameters to them, it's quite easy to write extra commands in SuperBasic to make program development easier. There are, however, a number of startling omissions, such as a line number TRACE.

The result is that while it's perhaps a mature programming language, it's one that demands some expertise and

"Many people have bought QLs just because of the four 'free' programs; they shouldn't feel disappointed because, for the money, they really are getting a bargain."

talent with Basic. Such ideology seems way off the beam; Basic is designed for newcomers and should go out of its way to provide a comfortable and fast environment to help people learn. Many QL buyers will be total newcomers and they would be far better off with something a lot more simple and friendly than SuperBasic.

### Four Of a Kind

Just like the QL itself, the four bundled application packages aren't quite what everyone expected. There's no doubt that they are serious business programs and as such are capable of doing useful work. However, this puts them into an entirely different ballpark to software for home micros and (perhaps not unnaturally) the Psion packages don't seem to compare well with many of their more expensive rivals

The major problem appears to be one of speed — a function that's probably something of a reflection on the QL itself. This is going to bother experienced users; they'll actually have to get used to waiting for the computer — hardly an ideal state of affairs. However, newcomers will probably be quite happy with the performance, until such time as they start to get the hang of typ-

ing and lose their fear of the system. Part of the problem must be the ambitious nature of the packages — certainly there are grounds for believing perhaps they attempt to do more than they should. One of the worst offenders for speed is QL *Quill*, the wordprocessor. When first announced, this was going to run entirely in RAM. In practice, it makes almost continual use of the second Microdrive as a scratchpad. So, somewhere along the line, the QL ran out of RAM, probably because of the deeply complex on-screen for matting facilities of the package.

Take Apple Writer II, one of the world's best selling programs (let alone wordprocessing programs). It runs entirely in RAM on a 64K system and has the most crude screen display of almost any wordprocessor. Yet millions use it every day! So why does the QL's potential need to be spoiled by a package that's effectively too big for the 128K machine? Psion's programs will very likely perform excellently on a big machine like the IBM or Sirius — but they are probably over the top for the QL.

Although the four packages sensibly cover almost all of the applications you might want, unfortunately, there's no way two or more of them can be loaded at the same time. Although it *is* possible to take information from one package and read it into another (to transfer spreadsheet results onto a graph for example), the time taken to write the data to a file, load the other program and re-read the data is a considerable deterrent.

The other worrying aspect is the way the packages are controlled by and respond to the user. Over someone's shoulder, or in screen shots, they look very easy and exciting. But try sitting down and doing a job and you're faced with a shockingly large amount of typing and some bizarre key sequences. The idea is to prompt the user through every step, so you often have to press ENTER where it's not really needed.

The programs also avoid the Control key. So, where on most programs you'd have held down Control and pressed A, the Psion equivalent will be something like F3, A, ENTER. Psion's method is of course easier to start with, but once you're used to the commands and no longer need the menus, trying to use the packages at speed requires extremes of dexterity and skill.

Although it is possible to get used to such a curious user interface, you can't cope with insecurity. The Psion programs mistreat the Escape key, usually ignoring it. This can be particularly frusOPINIONS

### SPEAKING FOR MYSELF

trating when something goes wrong with the Microdrives and you're forced to pull a cartridge out of the drive while it's still running.

No-one should lose sight of the fact that the four Psion packages do offer some real business software included in the price of the machine, and are usable. But, given the restrictions of the QL and the obvious rush in pulling the system together, they are far from ideal.

Many people have bought QLs just because of these four free programs. They shouldn't feel disappointed because, for the money, they'regetting an incredible bargain. However, anyone looking for a serious business machine would still be wise to budget a good £1000 for a working CP/M system.

### **Qualms About QDOS**

Behind the scenes on a QL is a ROMbased operating system called QDOS. Sinclair has made some very bold claims for the facilities it offers, making it sound not far distant from a 16-bit operating system like MS DOS 2. The company then turns round and points out that it can't demonstrate such features as pipes, multi-tasking and so on because they are not accessible from the Basic. There's not even any documentation currently available.

What little is known and demonstrable about QDOS is, at first glance, very impressive. All I/O devices are named (MDV1, MDV2, SER and so on) and you OPEN and CLOSE streams to them, PRINT and INPUT to and from them. Some support other appropriate commands such as CLS and INK or LOAD and SAVE. When you open a channel, you can pass an arbitrary string of characters, excluding commas, to the particular device driver software. This can be used as parameters for the driverandso, for example, you specify a filename when you use MDV1 or MDV2. A command to OPEN a CONsole in a screen window includes a rather ungainly spec for where the window goes. Sinclair Research has already let the syntax for such parameter lists get out of control and inconsistent

The beauty of the system is that any new device becomes part of the machine. A Centronics interface addon will probably become a CEN device. To print to it, you would OPENCEN with a parameter list that perhaps told it what sort of printer it was using and maybe informed it as to whether or not a screen dump was required. There's roomfor16Kofcodeforeachdeviceso there can be some pretty sophisticated devices in the system. Obviously, all this makes it easy to incorporate floppy and hard disk add-ons. QDOS recognises that devices are either character based (such as printers, keyboards, networks and so on) or

directory based (such as Microdrives and hard disks).

Once the calls to QDOS are available, there's plenty of room for improving the system. Perhaps a RAM-disk driver for half-megabyte QLs? Or maybe a fancy font generator for the screen and so on. With all this so nice, it's surprising that Sinclair has made some really bad decisions with the rest of the operating system.

Files are kept absolutely simple — all are effectively just collections of ASCII bytes and QDOS will happily dump any file on the screen or down the network using the Basic COPY command. This is not such a bad idea — as a consequence, you can do little things like create programs for the *Archive* database with a Basic program or import from the spreadsheet into Basic, and so on. SuperBasic programs are saved as normal ASCII so a straight file editor (not *Quill*) would provide a global editing facility.

QDOS is fine on the standard 128K twin Microdrive home computer. But the moment anyone puts a hard disk on the system, Sinclair will feel really stupid about the way it's done the DOS. There are virtually no file management facilities — no ambiguous filenames, no file types, no partitioning system and so on. This is fine if you have two drives with about ten files on each; it makes a hard disk system unmanageable.

It would be very hard to manage all of the promised features of QDOS from Basic. If it's to be a proper operating system, it needs a command line all of its own like the ones provided by CP/M and MS DOS. And for that matter, a cartridge of proper utilities wouldn't go amiss. There is a chance that, one day, this questionable operating system will be everything it promises — but I doubt it will be for some time.

### **Winding Down**

At the moment, it's hard to be enthusiastic about a product that was pre-announced and is suffering from a rush into production and premature placing into the hands of customers. The most obvious reaction is that only dedicated hobbyists and enthusiasts are going to dare to buy the machine. If the QL is to have any part in business computing, it needs to be sorted out very quickly.

And that's something of a shame because the design is a step forward (though hardly a Quantum Leap) for micros. Theoretically, there was a chance of producing a very versatile 68008-based machine with the added bonus of free software and twin Microdrives. The reality is a machine that needs a lot of work and Sinclair Research is looking distinctly as though it made a mistake. By the time the QL is sorted out, it will have competition - faster machines (with real 16bit chips) and perhaps, too, with disk drives. Fortunately both the QL and Sinclair Research are likely to be strong enough to survive that.

## **FIVESPENNYWORTH**

Journalistic users of the Sinclair QL give their blunt appraisal of the new machine.

Andrew Pennell is a consultant of Your Spectrum and a prolific writer of books, magazine articles and computer software.



The graphics facilities of the QL are excellent in most respects. The plotting of points and the drawing of lines and circles is very fast, even when filling simultaneously. Pixel scrolling is not super-fast, but adequate; text printing is surprisingly slow. The windows concept is a good one, but only really useful when used with multi-tasking. **2.** 

The mathematic functions are very well done, with an amazing range of up to 10A618 no less, allowing such calculations as Factorial 300. The power of the 68008 is clear when number crunching from SuperBasic, especially when you consider the range of numbers allowed.

3.

The second processor (an Intel 8049) makes a visible difference to some operations, such as the keyboard. No matter what the 68008 is doing, the 8049 still scans the keyboard and puts the characters into a queue, allowing typing ahead into a buffer during most operations. Given the speed (or lack of it) during *Quill*, for example, the keyboard arrangement is a god-send.

The QL has a nice, large expansion port, consisting of a real 64-way connector, with most of the signals anyone is likely to need — with the exception of an audio output pin. Whatever gets produced to plug into the socket will have a problem if the user inserts the plastic feet in the QL; the socket will then be at a 15 degree angle to the horizontal, and the peripheral will be half resting on the table, and half in mid-air.

**5.** The method for entering and editing lines is, frankly, terrible. If you key in a line wrong, it gets rejected with an annoying "bad line" message, necessitating a complete re-type. A similarly unfriendly response occurs if you EDIT a line incorrectly. In fact, the 'error' messages generated by the QL are almost as bad as the Memotech ones and you get the impression that the most useful ones were removed from the ROM when space was getting critical, leaving only a handful.

The most ugly thing about the QL is the

6

Kludge that hangs out of the cartridge socket - its 'case' appears to be a reject Microdrive cartridge! Another ugly feature is the choice of joystick sockets - not the standard 9-pin DIN. or even the non-standard Telecom jacks used for the serial ports, but a non-existent reverse Telecom jack that's totally unobtainable elsewhere.

Peter Shaw -- is a editorial teams on both Your Spec-trum and Your 64.



### 

This time, Sinclair are in the wrong market for messing customers around. They must have realised at the press launch that the machine was nowhere near complete and would be way off the announced delivery date of "the end of February".

### 2.

The QL is a complete system for £400; not many other computers come even near to offering so much for so little, in just one package. Apart from the main computer, you've got two RS232 interfaces, two joystick/control ports, two Microdrives built in, a networking facility, RGB interface and 128K RAM. Amazing value.

### З.

Superbasic, in my opinion, is a step back rather than a step forward for Sinclair. Its new commands can easily be recreated in ordinary bog-standard Basic. And to make room for these wonderful structure-forming commands, some of the standard Sinclair ones have been left out. The SCREEN\$ and POINT commands have gone, so you can't check the screen, making Basic games programs difficult to write

### 4.

The Microdrives are a bad idea. Although they seem basically reliable, they are no alternative to real floppies. They are slow, fragile, and the cartridges are grossly overpriced, temperamental and of dubious value; remember that, with the coming half-megabyte RAM extension plugged in, you won't be able to save any mega programs because the maximum a Microdrive cartridge can cope with is 100K.

### 5.

The Joystick/Control connectors are completely non-standard; any plans for joysticks will have to be shelved until someone comes up with a reverse 'Telecom' plug to 9-pin D way socket, so that 'standard' joysticks can be used.

### 6

The SuperBasic ROM looks a real mess. It's full of half-written routines and bits of old ones, partly written over. SuperBasic appears to change once a week, although Sinclair Research doesn't seem to want to tell anyone what they're taking out or putting in.

The manuals sent out with the first QLs failed to include a Keywords section presumably because Sinclair were planning to change the ROMs again

Stephen Adams is a widely recognised contributor to many computer magazines, and the author, too, of several books on Sinclair machines.

I like the vastly improved graphics and what is forecast to be the Basic although most of the commands are missing in the present model.

### 2

I dislike the lack of any decent information on the machine itself. The memory map system variables and I/O ports available are missing from the manual.

### 3.

The present Basic is bug-ridden. Pressing RETURN only on a numeric input crashes you out of Basic; the editor does no syntax checks and requires lines to be retyped; and no user defined code is executable.

### 4

The Basic uses no keyword storage and thus is wasteful of memory. This also makes it impossible to LOAD a program from the NET (from a Spectrum) and RUN it.

The keyboard and Microdrive code still need redoing - it can cause lock-ups.

### 6

Sending the QL back for an 'upgrade' (which is bound to take at least three weeks) will be unacceptable to anyone using a business machine; some method of upgrading locally must be found.

Surya — was, until recently, Pro-grams Editor at Personal Com-puter World. He is now a freelance writer.



### 1.

Doubtless the debate as to the nature of SuperBasic will continue, but whatever else it may be it's a powerful programming language. It's the first really innovative interpreter on this type of machine since BBC Basic.

Perhaps I'm prejudiced by using early versions of the QL, but I'm not at all convinced by either the speed or reliability of the Microdrives. I don't think I'd use the QL for serious work without a proper disk drive.

### 3.

Sinclair is 'pushing it' to describe the QL keyboard as "of professional quality". It's certainly adequate for programming and so on, but it doesn't compare with something like the BBC.

### 4.

The QL is worth shouting about largely because of the Psion packages. Without them, it's just a moderately interesting hobbyist machine. The device will lose some of its edge when the Psion packages appear on some of the cheaper CP/M machines like the Sanyo and Wren.

### 5.

The lack of any form of communications package is a notable one. For the professional working at home - the QL's target market - electronic mail and allowing users to transmit work over the telephone, is all but essential.

### 6

Not having seen any documentation, QDOS is something of an unknown quantity. From what I've seen so far, though, I think the remark made by a colleague that "QDOS makes CP/M look friendly" is a fair comment.

Dick Pountain — was the founding editor of Soft magazine and is still a regular con-tributor to the paper of Personal pages of Personal Computer World.



### 1.

The keyboard is better than previous Sinclair attempts (it would have to be!). Nevertheless it doesn't feel like a proper keyboard and it's tiring to type on; Space Bar and Enter are the worst offenders.

We didn't get an on/off switch but the Reset button is a step in the right direction

### 3

Colour and picture stability are excellent on a monitor, but not too bright on a TV. The choice of colours in 80-column mode should sell it well in Italy.

### 4.

SuperBasic is a big step forward. It allows you to write decently structured programs and is closer to everyone else's 'standard' Basic.

The Psion applications are first class (Easel is an ergonomic triumph). They are slightly let down by the slow Microdrives and the slow screen updating. (Why is the screen so slow? The Basic is no record breaker either.)

### 6.

Microdrives are not my idea of secure storage for business applications. They are cute, dinky, elegant, slinky, etc., but I prefer my mass storage to be built more like a brick sh\*\*house.

SLEEP

5.

## A MEASURE OF SUCCESS

Thinking of buying a QL? About to choose your machine from a selection of one? First let Henry Budgett tempt you with a little knowledge as he picks a disparate handful of potential QL rivals, analyses their worth, and suggests what the new device is going to have to do to succeed.

## **RIVALS AT WORK**

From the dozen or more familiar names already pitched for a slice of the small business cake, QL User picks seven for closer analysis.

### AMSTRAD

### **CPC464**

Manufacturer: Amstrad UK source of supply: High Street/Mail Order Price: £200 with monochrome monitor. £400 with colour monitor

Bundled software: Locomotive Basic in ROM

Operating system: CP/M available for upgraded disk version General description: Looking like yet another machine from the Henry Ford school of industrial design (any shape as long as it's black) the CPC 464 follows the current trend of being long and slim. The full-function keyboard is neatly colour-coded and equipped with separate numeric and cursor key clusters (although the latter are abysmally positioned). A built-in cassette recorder completes the unit which, given Amstrad's pedigree in sound systems (I hesitate to say Hi-Fi), is both neater and

better looking that I'd have believed possible. The accompanying monitor, whether monochrome or colour, is in matching livery and helps lift the machine from the run-ofthe-mill home computer category, to being something rather interesting. With potential for disk expansion in either 5.25 or 3-inch format (as yet undecided) already present in the machine and the provision of a printer interface fitted as standard, the Amstrad already appears to offer more for less However, the proof of the pudding is in the eating and that's a ceremony that has vet to take place. Hardware: Based, somewhat surprisingly, around the good old Z80 and 64K, the CPC 464 looks very familiar. Indeed, this configuration already reeks strongly of

CP/M, so it should come as no surprise to hear that Locomotive's disk system is planned to be CP/M compatible.

The screen is 80-column, yet another plus point, and offers three graphics modes with either 16, 4 or 2 colours available out of a possible 27. Clever memory management using a gate array allows both ROM and RAM to share the same memory locations, thus giving more than 64K to the Z80. Although this slows the processor down by about 25 percent, its benefits more than outweigh the disadvantages. The Commodore 64 uses a similar system but lacks the flexibility of the CPC 464.

Possibly the only item missing in the machine's repertoire is a serial interface to allow access to remote systems and databases like Prestel and Micronet 800. While this may appear a major problem at first, the designers did include a general purpose parallel port and a very simple piece of software is all that's needed to synthesise a serial system. Software: Amsoft, the sister company, promises to have some 50 programs available on the day of launch. For the most part these are likely to be games, but given the CP/ M potential and the fact that Amstrad is making ROM routines available (at a price) to software houses, there could well be serious material too.

Market sector: The Amstrad name is well known and carries a certain instant market definition. And strangely that could be the machine's biggest obstacle, regardless of how good it really is. For as long as the buyers of microcomputers for serious or semi-serious use reside in that sector of society which the sociologists label ABC1 while the games consoles and arcade machines are bought by the C2Ds — the Amstrad machine may never break ground in the home/ business market. Given its potential sales and CP/M compatability, that would be a crying shame. Support: None — as yet.

### **ACT APRICOT**

Manufacturer: ACT (UK) Ltd, Shenstone House, Dudley Road, Halesowen, West Midlands B63 3NT UK source of supply: ACT authorised dealers Price: £1495 to £2995 (ex VAT) Bundled software: Basic, Cobol, SuperCalc, Communications, Manager Operating system: MS-DOS, CP/ M-86 General description: ACT set a new standard for neatness and

standard for neatness and portability in the business market with its design of the Apricot. The concept of carrying a computer between monitors is, to say the least, an interesting one. Packaged into a very slim white case and featuring a detached keyboard, the system looks nice and handles well. By choosing the then unproven 3.5-inch Sony disks, ACT kept the physical size down while still offering a machine equally as powerful as its Sirius predecessor.

Even though the initial design of the system was achieved in the UK, now only

Amstrad CPC 464: A solidly-based example of the consolidationof tried and tested technology. What do you think is the most significant difference between the American business community and its UK counterpart? Disposable income ... Gross turnover...Bigger business lunches...No, what's really staggering is the fact that those people in UK businesses who process or manipulate information are twice as likely to have a computer to help them as their American counterparts! Hard to believe, isn't it? However, so great has the American quest become for a really usable office computer that humble clerks are being alled knowledge workers and, by the end of the decade, the corpses of

the final assembly is done here — the boards themselves are built and tested somewhere East of Aden. The original concept of a fully portable micro, complete with flat-screen plasma type display, went out of the window at a very early stage; with the advent of Sharp's new 80 by 24 LCD (See the Apple IIc) this may change.

Hardware: Based on Intel's 8086 16-bit processor and 256K of RAM as standard, the Apricot, despite its small size, has a lot of room for expansion. Should you want 'go-faster' maths it's possible to fit the 8087 co-processor directly into the main PCB. Likewise the internal expansion bus can be fitted with extra RAM to bring the total to 768K. The single most popular expansion, however, is likely to be the (at long last BT approved) modem board which gives the Apricot-toting business person access to systems like Telecom Gold, as well as remote contact with any other suitably equipped computer.

The only dislike I have is of the keyboard, which feels rather dead. The keys themselves have a very short travel, and although there are all the function, cursor and numeric keys a user could want, it somehow lacks the quality of the rest of the unit. This view, to repeat, is a highly personal one but as the keyboard is the sole source of interaction with the machine, it's a point to watch out for. ACT has made provision for a mouse to be added but, as far as I know, no suitable device has yet been attached.

On the peripheral side ACT has provided a single serial communications port and a parallel printer port so in theory there's no several major hardware companies are expected to litter the battlefield.

Into this potentially bloody arena steps a gentil, parfait knight. No not an American, but our very own Sir Clive who, with just a small black box labelled QL, has every intention of being one of the survivors. Sinclair Research may, in terms of sheer volume of sales, be one of the world's biggest computer companies, but its pedigree for producing business systems is hardly a match for the likes of IBM, Apple and ACT. What Sinclair Research must be aiming to do in the UK market is to saturate potential buyers of competitive equipment with its own low-cost alternative .

If that sounds a little far-fetched, consider the pricing. For £400 — which is almost petty cash to a major company — the manager, department head or chief clerk gets a computer complete with enough software to make his or her job several times easier than before. The fact that the software and hardware have limitations that an expert can spot ten feet away doesn't even enter into the first time user's mind recognise the name, read the glossy advertising, buy one. We have a very strong tradition in the UK of supporting home-yrown products, despite what

> ACT Apricot: Tilted towards the lower end of the business market, you can start small and build up.

those in the know it seems to take forever to do anything! Underneath this fancy wrapper is Supercalc, a souped-up 16-bit version of Visicalc, MBasic, Cobol, the MSX bits graphics extension to BASIC and sundry other bobs. The power of Supercalc is somewhat suspect - my old 8-bit Multiplan runs rings round it but all the rest work very well indeed.

Third party packages abound, including ACT's own Pulsar range (which, incidentally, is also available for the IBM PC). The Apricot I use daily runs the latest *Wordstar/Mailmerge* and makes excellent use of the various function keys and Microscreen; *Cardbox* works just as well without using them.

Market sector: Aimed straight at the small business market the Apricot also has considerable appeal to users already familar with the Sirius and those who might want to start small and build up from there. Being British probably helps and its warm welcome from Press and industry alike has made its success a certainty. The prices are also attractive enough to make the home/ businessman consider the system against the likes of IBM and Mac.

Support: Growing by the day it seems. Alternative hard disks were available before ACT's own and a lot of other exotic devices are also waiting in the wings.



excuse for not getting the machine up and running in a very short time. Well, that's not quite true. A standard Epson FX-80 printer connected through a standard parallel cable to the Centronics port will consistently produce double line feeds regardless of any internal switch setting on the printer. The only answer is to disconnect pin 14 something that the novice may well balk at.

The dedicated monitor provides for the usual 25 lines of 80 characters, or can be bit mapped to give 800 by 400 pixels. Also thrown in for good measure is a two-line LCD on the keyboard called the Microscreen. This, coupled with six touchsensitive panels, acts as a sort of mini command console as well as being a clock/calendar and fourfunction calculator. When you're choosing software from some third party sources, remember to find out whether or not the Microscreen is used; it can make the difference between user friendliness and the boringly normal. Software: Bundled in with the Apricot, or so ACT claims, is £750-worth of business software. The first item to make itself felt is the Manager - a very (almost sickeningly) user friendly front panel for all the major system functions. For the non-expert it's all very nice and easy to use, while for

### THE OPPOSITION

### A MEASURE OF SUCCESS

the foreign manufacturers would have us believe!

So within the UK, and especially within the smaller business arena, the QL will definitely make an impact ... the size of the QL 'Trust Fund' already makes that abundantly clear. The interesting thing, of course, is how the QL actually fares when it's ranked firmly against the likes of ACT, Osborne, Apple and IBM. Therefore in this survey we have set out to analyse the battlefield and to study what the QL will have to match (if not exceed) in a typical group of systemsa group comprising the kind of machines that any well-informed company might be looking to buy to join the Information Technology society. The range varies in price and performance, both above and below the potential of the QL, and all the observations made are based on the known characteristics of the systems. Obviously some are so new that, like the QL, they have hardly graced these shores in sufficient quantities to make any real impact. How-

sized keyboard of

ROM containing all

Sinclair) the system

windows, pull-down

menus and so on and

128K of RAM. If the user

memory seems rather

small it's because

Apple is waiting

256K RAM

chips before

for the new

(according to

something like an IBM.

Packed onto the single

PCB processor is a 64K

routines to handle icons,

ever, they all share a burning desire to be the machine to sit on your office desk.

Those involved both in working on the move and from home, echo a growing demand for systems that are powerful and portable; many of the computers featured here are equally suited to either home or office, although none could really be considered a glorified games console. Just as important for those working within strict financial limits is the fact that the most expensive system here comes out around £2000 while the cheapest is a mere £200. In many cases it's even more

### APPLE

### MACINTOSH

Manufacturer: Apple Computer (UK) Ltd, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ UK source of supply: Apple dealer network

Price: £1795 (ex VAT) Bundled software: Launch offer includes MacWrite and MacPaint

Operating system: Apple's own General description: Based on the same 'desktop-metaphor' idea as its forerunner the Lisa, Mac — as it's affectionately known — has to be about the most idiot-proof machine yet produced. Using the mouse as a superfast set of cursor keys all the main functions of the computer and, more importantly, the

accompanying software are accessed through screen symbols called icons. For the total computer novice this is almost certainly the way to do things; the computer literate may well find the constant need to move from keyboard to mouse and back again somewhat irritating — I certainly did.

However, the enormous amount of support for the machine — around 100 software houses on both sides of the Atlantic signed on the dotted line before a single production machine rolled out of the new automated factory — means that when it comes on to the UK market in June the user will have a lot of power at his disposal.

Full compatibility with the Lisa is achieved through a special software package called *MacWorks* and the two systems can also communicate through a local area network. In the USA the machine has already smashed its own projected sales figure and reduced IBM's already struggling PC junior to the status of an also-ran. While it has some quirks that the experienced may find frustrating it isn't really aimed at that marketplace although that's not to suggest that the

experienced user won't still get a lot from it. Rated, if you like, on a personal usage scale of 1 to 10 the Mac gains a hard-earned 9 in my book, and I certainly don't qualify as an inexperienced user!

Hardware: Based on the real 32bit 68000 processor from Motorola, the Mac comes in an amazingly compact package. The footprint technical jargon for how much desktop space it consumes - is not much bigger than a telephone, taking a miserly 10.9 by 9.7 inches and standing just 13.5 inches high. The detached keyboard and the mouse, on the other hand, take up rather more space than the conventional, full-

producing a 512K version. Also inside the main unit is a nine-inch high resolution monochrome monitor (there are definitely no plans for colour) which supports 512 by 342 pixels; all displays are graphic based, even the text, which is why the displays look so great. A single Sony 3.5-inch disk is included that holds some 400K; an external drive is available and can be connected to the rear, while Winchesters may well be in the offing. Apart from the second disk interface Mac supports its mouse, two serial ports (one for the Imageprinter, the other for communications) and a polyphonic sound port. Oh, and there's an on-board clock/calendar too. Software: Initially the Macintosh comes with MacWrite and MacPaint included but among the already available or soon to be released software is virtually every best-seller that the business market has ever seen. Almost all Microsoft's range is planned or already converted including the best (in my opinion at least) spreadsheet on the market, Multiplan. Languages are available from Basic to Pascal and beyond; and if you can't do it on a Mac then

do it on Lisa in C and move it across in machine code! The support for a product that was totally unproven at the time the deals were struck speaks volumes for the industry's faith in Apple; time alone will tell if it's all been justified.

Market sector: Apple itself has pitched the machine directly into the 95 per cent market that's the business sector whose personnel have yet to get a computer of any kind to help with the workload. The price is attractive enough for it to become a viable alternative to many of the top-end home/business computers and the machine will undoubtedly appeal to writers, designers and so on. The price is also right for the student population and clearly Apple believes, just as Jack Tramiel of Commodore used to, that if a student gets familiar with a type of machine, he or she will carry that brand loyalty on into business life. Support: Basically, if you want it then somebody's either made it or is just about to. Even though the machine is still very new, Apple's policy of supporting third party developers means that virtually every need will be met.

### **APPLE IIc**

Manufacturer: Apple Computer (UK) Ltd, Eastman Way, Hemel Hempstead, Hertfordshire HP2 7HQ UK source of supply: Apple dealer network Price: £925 (ex VAT) Bundled software: Applesoft Basic in ROM, 6-disk training course Operating system: ProDOS (also runs DOS 3.3) General description: When Apple gave the rather ancient II+a pick-me-up in the form of the lle and announced a whole load of extras, from mice to

important to see just what else you're getting for your money. Does the package include 'free' software? Are service and back-up on hand? Are peripherals and software available from third party services?

It's the kind of comparison that can take days of ploughing through the pages of dozens of magazines — and that's hard work. To save all that trouble, right here we've rounded up the essential information on seven of the QL's principal rivals in the small business/personal arena. And to help balance the equation, we've also concocted a comparison chart that highlights how the QL fares against a number of home micros.

### **QL Cross Check**

The small business/personal micro chart considers many of the actual and potential windmills that the gallant Sir Clive will be tilting his QL at. So let's chew over and compare some of the known qualities of the rival machines and see how the QL stands up in the light of experience and analysis.

Taking things in the order of the chart, we'll look first at the QL's central processor.

Apple claims that its Macintosh is a 32-bit machine and so does Sinclair; neither, in my book at least, are right. The 68000 has a very powerful internal architecture based on 32 bits, so does the 68008, but neither of them can communicate with this in chunks of data 32 bits wide! The 68008, as its name suggests, has an 8-bit data bus and so is little better than a 6502 or a Z80 when it comes to the transfer of information within the computer system. Where it does score though, is in its addressing capability and the immensely powerful instruction set. So, the 32-bit

hard disks, it become obvious that something was in the works. That something was the IIc - possibly the biggest potential seller in the portable market yet. Based firmly on the Ile's architecture but with a longoverdue upgrade to the disk operating system, it packs everything but the display into a 7.5lb, 12 by 11.25 by 2.25-inch box. Display is through a matched nine-inch monochrome monitor, your TV or (most exciting of all) a true 80-column by 24-line LCD display.

As a piece of hardware the IIc hardly breaks any new ground; the LCD is Sharp's, but as a package it effectively sets out to bring disk-based computing to every corner of the market. In providing the mouse as part of the product, Apple is also educating the user into the same way of thinking as the potential Mac owner long-term strategic planning perhaps? The original II and II+ are reported to have sold two million units worldwide since their launch in 1977. However Apple is hoping to sell a whopping one million units of the IIc this year and, with the support the product range has, the company could well achieve it.

Hardware: As with the IIe, the IIc is based on the 6502 - but in CMOS form, which makes it slightly slower. Effectively the system contains an extended 80-column card giving the extra 64K, a disk controller card, two serial cards and a mouse card as well as the single 5.25-inch disk. The packing density is achieved with custom designed chips which make something like the BBC Micro's much-vaunted ULAs look positively archaic.

The designers also took the opportunity to boost the graphics facility to 560 by 192 pixels and provided 16 colours rather than the normal eight. Although the disk holds just 143K, the format was maintained for compatability and 3.5-inch drives may well appear as add-ons; the new DOS, ProDOS, is around eight times faster than the previous DOS 3.3 although the latter can still be used. The new keyboard is a little 'flat' for my personal taste but it's still among the best to be found on any portable and features all the extra keys found on the IIe.

If Apple can make the IIc stick, along with the hintedat but as yet inseen replacement for the existing lle, then the company may bring about a remarkable coup. While the IIc is by no means a Mac - even with the mouse - and lacks the second processor capability of the standard system, it does have the biggest single support system of any computer in the home/ business sector. If you add to this the fact that there's nothing to stop it communicating directly with bigger machines that run exactly the same software, then it becomes an almost too-obvious choice. Software: While many computers are fortunate if they have a few hundred software packages available, the IIc, on its day of release, will have a staggering 18,000 proven packages! Of all these, and there are some really great names in the list, the single biggest seller will almost certainly be AppleWorks. This is an integrated package consisting of a wordprocessor, data base and spreadsheet which knocks the stuffing out of anything else yet seen in the 8-bit software market. It does have its shortcomings the wordprocessor cannot use data base files to create

form letters — but with a price tag of just £175, who's going to quibble about that! Launched along with the IIc were new versions of Pascal, Logo and Access II, giving the system appeal in the classroom and home just as much as in the office and on the move.

Market sector: The sales pitch is that the IIc is 'For work. For home. For everywhere in between'. It would take a braver man than me to try to dispute it!

Support: Apart from a printer and there are two new lowcost ones from Apple — and a modem, there's precious little you need to add. The system lacks the internal expansion capability of the II+ and IIe so extra cards and second processors won't work anyway: it already has enough RAM and a full 80-column screen.

Opposite page: Apple Macintosh: Virtually every need is software met; suitably novice orientated, with mouse and icons.

Apple IIc: "For work. For home. For everywhere," says the sales pitch. Certainly there's plenty to recommend it.



### THE OPPOSITION

### **A MEASURE OF** SUCCESS

which can handle 8-bit data is as powerful as many 16-bit processors!

The memory capacity of 128K is generous by anyone's standards, although the system should be capable of going up to 1M rather than the 640K offered by Sinclair. More important is how much of that memory is really available to the user

at any one time and, once again, we've yet to discover the full answer; still, with 32K going for the screen, it's liable to be rather less than you may have first thought! The ROM is still expanding but seems set to level out at 48K; the chances are some of the anticipated features will be missing from the eventual version, concurrent processing being the strongest candidate.

In terms of keyboards the QL lags behind. Α professional system demands a keyboard with tactile feedback and a very positive touch two things the membrane system lacks. Rated against the domestic system it's quite acceptable but I suspect that the response may well be slow and a fast typist could find the odd character getting lost. While it is blessed with function keys, the lack of a numeric pad is unfortunate and the cursor keys are not ideally clustered for quick editing. On the display side the QL does pretty well, although with all that RAM I'd have liked to have seen an eight-colour high resolution mode rather than just four. The quirky 85-character line seems a little excessive but there are 40 and 60 character modes for TV display.

### IBM PC

Manufacturer: IBM UK source of supply: IBM authorised dealers Price: £1998 to £4140 (ex VAT)

Bundled software: Depends on dealer

Operating system: PC-DOS (MS-DOS in a different wrapper!) or CP/M-86

General description: When the market heard that the industry's pet giant was to enter the micro arena it collectively trembled. Well, in the USA it did - over here IBM was about 14 months too late and the ACT Sirius (the now defunct Victor 9000 in America) has stolen the show. On a global scale the PC has grabbed some 30 per cent of the potential business market and that's in spite of it comprising a pretty average piece of hardware! Shows just what a big. well-known name can do for you

Possibly the biggest single measure of the machine's acceptance as the 16-bit standard is the sheer volume of the clone market. You can buy IBM look-alikes in portable as well as desktop versions from a dozen or so suppliers on both sides of the Atlantic. Quite how much these clones really do duplicate the original varies from maker to maker but as most come with bundled software anyway, it doesn't really matter as the end user is unlikely to buy one of each and share the disks between them. For corporations that have already installed IBM mainframes the equation becomes easier to deduce because few of the clones can communicate with their bigger step-brothers and that's where IBM will, for the forseeable future at least, continue to make its money. Hardware: The system varies in

organisation depending on the user's needs. You can start with a single 320K disk and 64K - or go the whole hog and have a 10Mb Winchester, 128K of RAM and a 320K floppy disk.

Based on Intel's 8088 8/ 16-bit processor the system breaks no new ground at all except, possibly, in the provision of a really

### IBM PC: Innovative, it's

not, but with enormous software support plus the clout of IBM, you can't disregard it.

each character has an extra byte associated with it to determine whether it's underlined, highlighted, inverted and so on. The colour card supports 8 background and 16 foreground colours and the extra expense is well worth it if you're into pretty graphics. Software: Given IBM's corporate muscle it should



excellent keyboard that everyone else is now copying. There are enough functions available on the keyboard and its associated numeric/cursor and function pads to take the rest of this article to detail; suffice to say it offers everything you are ever likely to want. The basic machine supports an 80column, 11.5-inch monochrome monitor with colour available as an optional extra. Peripheral support includes a parallel printer interface (IBM's PC Printer is really an Epson) but serial communications and the rest come as extras.

The graphic display formats vary according to whether you're using monochrome or colour; the resolution is 640 by 200 in black and white, 320 by 200 in colour. IBM uses all eight bits of the video RAM so

come as little surprise to find that virtually all industrystandard types of package are available - though don't expect to find any bells or whistles attached. The limited processing power of the hardware makes the IBM the 1984 equivalent of the 1982 Z80+64K+CP/M system. Some light relief is added, however, because in the US the machine is regarded as a home/ business system, as opposed to the strictly professional tag it has over here. As well as writing the PC-DOS operating system, Microsoft threw in one of the best pieces of test software ever produced - Flight Simulator. If you're being offered an IBM-clone (even WH Smiths is stocking them these days) ask to see this demonstrated; very few clones can run it properly, so

if it works then you're on to a winner

Market sector: In the UK the machine is regarded as being a strictly business/ professional computer and, as such, is meeting competition from systems like the Apricot, Sirius and Macintosh. It's still done well here, in spite of its very late arrival; perhaps that's partly because if you need a loan to buy one, your bank manager is much more likely to smile with approval on a name he already knows. The real interest comes when one starts to consider the kind of revenge IBM may be planning on Apple for its leap into 32-bit technology with the Macintosh. If IBM produces a suitable rival in two year's time — then the whole cycle could start all over again and very few companies would survive that upheaval. Support: Thanks to the US market penetration, support is enormous. But, and it's a big but, the potential for expansion is limited by design and that means

careful consideration should be given to prescribed areas of use. All the current 'goodies' are available from mice to modems - and at third party supplier prices rather than IBM's.

### **COMMODORE SX-64**

Manufacturer: Commodore (UK) Ltd, 675 Ajax Avenue, Slough, Berkshire UK source of supply: High Street/ dealer network Price: £895 Bundled software: Basic 2.0 in ROM, EasyScript, EasyFile, Future Finance Operating system: Commodore's own General description: As a home computer the original Commodore 64 was a remarkably well thought-out

piece of equipment.

Getting information into and out of the machine appears, at first sight, to be easy. The troubles come when you find that the two serial interfaces are actually mirror images and cannot be configured to run at separate baud rates. Serial printers are slowly making a comeback but the majority are still parallel interfaced, so the lack of a suitable port is a nuisance. Sinclair's promised adaptor for this is likely to find itself competing against a multitude of third party creations.

Why a serious machine should want two joystick ports is something of a mystery — in fact it smells like a rat (oops, mouse) to me. But among the most useful of the interfaces is the Local Area Network which in theory allows ZX Spectrums and QLs to interchange information. One hopes this is expanded to include other systems, although I expect the independant developers to get there long before Sinclair! The expansion bus is also likely to be getting a fair degree of attention, but more of this in a moment.

Of all the features that the QL possesses, the Microdrives must surely rate as the most non-standard. There is no other system anywhere

that uses them - even the Spectrum ones are different - and their storage capacity and speed are poor to say the least. Sinclair has promised a Winchester which, I strongly suspect, will be treated by the QDOS operating system as a vast (and therefore slow) Microdrive. The third party hardware guys are going to be scrambling to bolt 3-, 3.5- and 5.25inch floppy disks onto that expansion bus. While the effort is extremely laudable it'll be interesting to see what operating system they use. Unix is out for a start and none of the standard 8-bit ones appear to be

Designed to compete with the likes of the Atari 800 (and the Apple II if we are to believe Commodore's marketing) the machine offered sound, colour graphics, sprites and much more. And games plus the results of your programming, could be reproduced on a standard colour television, or an optional high quality colour monitor.

When Commodore displayed a trio of 64-based portables at the 1982 Winter Consumer Electronics show it became clear that the company was preparing to attack the portable market. At the time the only portables wielding any real impact in the market were the Osborne and its imitators, so the concept was interesting. The first European showing of the machine was at the Hanover Messe in April of last year and the final version, the SX-64, was launched here at the beginning of the year.

Unfortunately, since the original showing of the machine, the market for portables has changed slightly and it's a moot point whether the machine can still compete with systems like the Compaq, Hyperion (which Commodore is about to sell in its own corporate wrapper!) and Apricot to mention but a few. Clearly Commodore believes it can and, with a price tag of less than £900, its only immediate price rival is the Apple IIc.

Hardware: Commodore is careful to state that the SX-64 is 'based on' the existing 64 model; in fact the actual hardware has been substantially re-designed to make it fit the new role. The casing measures 14.5 by 14.5 by 5 inches and the lid (containing the keyboard) detaches to reveal the integral screen and disk drive unit. The handle seems specially designed to make carrying the SX-64's 24.6lbs of all-up weight a very unpleasant experience!

On the interface side Commodore provides a parallel user port that can be adapted to drive the IEEE 488 devices, two nine-pin joystick/serial interface connectors and two DINtype sockets that support the serial interface for disks, printers and the full sized colour monitor. Conspicuous by its absence is any means of connecting the SX-64 to a standard television set which means that you've got to buy the Commodore monitor or the cassette port. The normal 64-type cartridge port is retained, however.

The keyboard is detached and therefore a cable is needed to link it — which plugs into the underside of the main unit; neglecting to remove the cable before swinging the handle into the carrying position can neatly smash the keyboard plug. Text display on the 5-inch colour monitor is the standard 25 lines of 40 characters and is quite legible, although you really need a full-sized display for non-remote operation.

The basic hardware is much the same as the old 64 and there's still a dedicated video chip that handles all the graphics and sprites, plus a sound chip. The memory arrangement is the same (no traces of elephants were found) and the system should be entirely hardware compatible with the existing 64. All the processing is done by a 6510, an upgraded 6502-type chip. Software: Being a bundled machine you get £210-worth of 'free' software -Easy Script, Easy File and Future Finance. At least one software house has now cocked a snook at the 64's disk system and uses a 'turbo load' cassette alternative which actually loads faster than the existing disk! Users with a burning desire to achieve this on the

SX-64 have, of course, been stymied by Commodore's removal of the cassette port...in return Commodore is now offering a fast 1Mb disk but that requires extra hardware.

Apart from the massive Commodore software library there's a large supply of independantly produced material that you can feed the SX-64. Commodore's claim that all existing software will run perfectly on the new machine has met with at least one rebuttal. Market sector: While Commodore would love to see the machine being used as a serious business portable, the speed of the disks and the vast amount of games software available will probably lower the market to the homebusiness level. It also looks very attractive to the serious home user looking for a diskbased system with a high

entertainment content. The education sector could also prove very receptive to the machine, especially as it's likely to be built at Commodore's new Corby plant and so qualifies for all sorts of educational schemes. Here, once again, the software support could play a very big role in the machine's future. Support: In terms of hardware support Commodore users do better than most. As well as being able to add extra disk drives, externally you can pick from a range of printers, a pen plotter, the VIC modem and a clutch of monitors. For the avid games player several types of joystick, paddle and trackball are available and the ultimate in oneupmanship — a speech synthesis module! Apart from the various Commodore peripherals, a number of independant offerings also exist.



the slow disks; luggable, and with good all-round potential.

	Ors	SX-64       Osborne 01       Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Image: Sinclair (       Image: Sinclair (         Image: Sinclair (       Im		Z80A 68008	8 32/8		64K 128K	64K 640K	55K 94K	4K 32K (48K)		Machanical Membrane	69 65	Yes No	Yes No	s) No 5		r 5-inch mono No	Connects to Connects t monitor/TV monitor/TV	No	25x85
6	siness competit	t Commodore S 5895		6510	8		64K	64K	lent 39K	26K		Mechanical	66	No	No	4 (8 functions		5-inch colour	ed Connects to monitor/TV	No	25x40
	r seven small bu	Act Aprico		8086	16		256K	768K	Software depend	4K		Mechanical	96	Yes	Yes	9		No	Monitor Supplie	Microscreen	24x80
0	s out against ou	the IBM PC E 11998 to E 4140		8088	8/16		64K	640K	42K	40K		Mechanical	83	Yes	Yes	10		No	ur . Monitor supplied	No	24×80
Π	how the QL pan	Amstrad CPC 46 £200/£400		Z80A	8		64K	64K	43K	32K		Mechanical	74	Yes	Yes	No		No	Monitor supplied, colo	NO	24x20/40/80
	dge for yourself	Apple IIc 2925		65802	8		128K	128K	48K — 96K	12K		Mechanical	63	No	No	No		No	Monitor supplied, connects to TV	Optional	24x40/80
	лſ	Macintosh		68000	32		128K	512K	Software dependent	64K		Mechanical	58	Optional	No	No		9-inch mono	No	No	Software controlled
			PROCESSOR	Device	Number of bits	MEMORY	Total RAM	Maximum RAM	User RAM	Total ROM	KEYBOARD	Keyboard type	Total keys	Numeric pad	Cursor pad	Function keys	DISPLAY	Integral	External	LCD/Plasma	Text

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Monochrome graphics	512x342	560x192	640x200	640x200	800x400	320x200	No	512x256
Colour graphics	No	560x192	640x200	Optional	No	320x200	No	512x256
Foreground colours	No	80	27	Mode dependent	No	16	No	Mode dependent
Background colours	Nö	8	27	Mode dependent	No	16	No	Mode dependent
Sprites	No	Yes	Yes	No	No	Yes	No	No
INTERFACES			•					
Parallel	No	No	1			t	Ŧ	No
Serial	2	2	No	Optional		t		2
Joystick	No	+-	2	Optional	No	2	No	2
Mouse	Supplied	Supplied	No	Optional	Optional	No	No	No
Sound	Polyphonic	Beep only	3 channels	Beep only	Beep only	3 channels	Beep only	1 channel
Expansion hus	No	No	Yes	Yes	Yes	Yes	No	Yes
STORAGE								
DOS	Dedicated	ProDos/Dos 3.3	CP/M	PC-D0S	MS-DOS, CP/M-86	Basic 2	CP/M	QDOS
Integral	1 x 3.5ins disk	1 x 5.25ins disk	cassette, disk drive promised	2x5.25ins disks	2x3.5ins disks	1x5.25ins disk	2x5.25ins disks	2 Microdrives
Winchester	Optional	No	No	Optional	Optional	No	Optional	Interface TBA
SOFTWARE								
Wordprocessor	Supplied	Available	Available	Available	Available	Supplied	Supplied	Supplied
Database	TBA	Available	Available	Available	Available	Supplied	Available	Supplied
Spreadsheet	Optional	Available	Available	Available	Supplied	Supplied	Supplied	Supplied
Graphics	Supplied	Available	Available	Available	Supplied	Available	No	Supplied
Games	Supplied	Available	Available	Available	No	Supplied	No	Available
LANGUAGES								
Interpreted Basic	Supplied	Supplied	Supplied	Supplied	Supplied	Supplied	Supplied	Supplied
Compiled Basic	ONO	Available	No	Available	Available	Available	Supplied	No
Pascal	Available	Available	Available	Available	Available	Available	Available	TBA
Assembler	Available	Available	Available	Available	Available	Available	Available	TBA
Others	Logo	Logo, Pilot	Forth, C, BBC Basic	APL, Cobol	C, Cobal, Fortran, PL/1	No	Forth	TBA
NOTIONAL AREAS OF PRIME API	PLICATON							
Business	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education	No	No	No	No	No	No	No	Yes
Games	No	Yes	Yes	No	No	No	No	Yes
PHYSICAL DATA								
Size	10.9x9.7x13.5ins	12x11.2x2.2ins	23x2.7x6.7ins	19.6x16.1x5.5ins	16x12.5x2ins	14.5x14.5x5ins	21x10x18ins	18.7x5.4x1.7ins
Weight	9lbs	7.5lbs	5.3lbs	20.9lbs	16.5lbs	25.6lbs	24lbs	3.1lbs
Luggahle	No	Yes	No	No	Yes	Yes	Yes	No

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uture Sir Clive sees for his latest brainchild. It's officially labelled, too, as a personal when you consider some critics' claims that it's destined as well to become a great games machine. QL User pitches it against a random selection of home/personal micros, leaving it up to the reader to see how it shapes up. computer and that takes it into the realms of home computing — the more so still The QL as viewed from the small business front is just one aspect of the bright

			MEMO	IRY		KEYBO	ARD				DISPLA			-	INTE	RFACES	STO	AGE
	WON	ORAOWATS	WWW HISSA	XXM MAR	ઉત્ત	SANNA SO OK	WEARSON CANSON WEADON CANCENIC	NU NOIL SAIN	BBB	UEXL LEXL Dans	SJIHU SJU	10 ON	SJIIBds SUND	SEBINT SEBINT	EXPANS:	STANNERS LO: OK NOICE	WEDINW WO	INC AND BUICE
SINCLAIR QL	48K	128K		512K	Semi typewriter	84	•	•	•	74x24	256×512	8		•	•	-	loopy-tape	£399
AQUARIUS	8K	· 4K	2K	20K	Rubber-membran	49		•		40x26	80x72	16			•	1	Cassette	£49
BBC MODEL B	32K	32K	*	32K	Typewriter	74	•	•	•	80x25	256x640	16	•	•	•	4	Cassette	£399
COLECO ADAM	32K	80K	28K	80K	Typewriter	75	•	•		40x24	159x256	16	*	•	•	1 Dig	ital Cassette	£499
COMMODORE 64	20K	64K	38K	64K	Typewriter	61	•	•	•	40x25	200x320	16	•	•	•	3	Cassette	£289
DRAGON 32	16K	32K	*	32K	Typewriter	53	•	•	•	32x16	192x256	8	•		•	1	Cassette	£159
ELECTRON	32K	32K	*	32K	Typewriter	55	•	•	•	40x25	265x640	16			•	4	Cassette	£199
LYNX	16K	48K	16K	192K	Typewriter	57	•	•	•	80x40	248x258	8		•	•	0	Cassette	£199
ORIC ATMOS	16K	48K	37K	48K	Semi typewriter	57	•	•		40x27	200x240	8		•	•	4	Cassette	£170
SHARP MZ-700	6K+	64K	*	64K	Typewriter	69	•	•	•	40x25	80×50	16	•	•	•	1	Cassette	£249
NEWBRAIN	28K	32K	27K	128K	Semi typewriter	62	•	•	•	80x24	250x640	B/W	•	•	•	0	Cassette	£185
SPECTRAVIDE0	32K	32K	13K	128K	Typewriter	57	•	•		40x24	192x256	16	•		•	3	Cassette	£262
ZX SPECTRUM	16K	48K	41K	48K	Rubber-membran	40	•	•		32x24	176x256	8		•	•	1	Cassette	£124
ADVANCE 86A	64K	128K	*	256K	Typewriter	83	•	•	•	80x25	200x640	8	•		•	   	Cassette	£399
VIC-20	20K	5K	3.5K	32K	Typewriter	65	•	•		23x22	176×184	16		•	•	3	Cassette	£89
															Contractioners	CONCERNMENT		

\* Varies depending on the graphics mode † Monitor only — interpreter resides in RAM \* Printer supplied using non-standard interface

viable. The only obvious option is to write new ones and then the nonstandard spiral really begins in earnest. No small wonder that the software houses are keeping very quiet indeed!

On the software side the QL comes with everything you want — or, to put it another way, it comes with the only software there is! The saving grace is that the product seems to be very good. Quite how Psion managed to create it all without a single finished QL at its disposal beats all the other wonders of the world into a cocked hat; how much independant software

is likely to be created is impossible to tell. The trouble is that many would judge a machine on the strength of its software support and, at the time of writing, the QL has none. Doubtless this situation will change but the problems with duplicating Microdrives (not to mention the fact that you have to buy them from Sinclair in the first place) would seem to be an unresolved factor. On the Spectrum there is less than a handful of Microdrive-based packages - but many that can be transferred from cassette. It's an option that simply doesn't exist on the QL.

There is no doubt that the thing will sell. The question is will it sell enough to warrant third party investment? When the Spectrum was launched it was initially less successful than had been hoped - the early hardware problems didn't help at all. If the same thing happens to the QL (which is in a much more vulnerable sector of the market) the effect on Sinclair could be greater. While the team at Sinclair is struggling to put right all the problems, somebody else could, just conceivably, steal the market Sir Clive created for the QL right out from under his nose.

### OSBORNE 01

Manufacturer: Osborne UK, 38 Tanners Drive, Blakelands North, Milton Keynes, Buckinghamshire MK14 5LL

### UK source of supply: Multiple outlets

Price: £945 to £1595 (ex VAT) but watch for bargains Bundled software: Wordstar, Mailmerge, SuperCalc, MBasic, CBasic (plus others) Operating system: CP/M-80 (CP/ M Plus on the Executive) General description: Designed and created by expatriate Adam Osborne, here is the original portable business computer that everyone thought was doomed to instant failure and then scrambled to copy. Sadly, after a couple of years in the headlines, the Osborne empire did crumble and the only segment alive today is the UK operation. The reasons for the failure are many and complex, and it's a tribute to the machine's strengths that it survives in any form at all.

One major reason for many of its opponents

regarding the machine as a serious threat has been its bundled software. Included in the, already very reasonable, price are Wordstar, Mailmerge, Supercalc and two versions of Basic. The software alone should have cost nearly as much as the hardware, yet it was all included in the cost. Results of this direct challenge to the way the computer makers traditionally marketed their devices are still being felt today; nowadays virtually every machine comes with some software included in the cost.

Hardware: A traditionally designed Z80 with 64K of RAM, the Osborne 01 didn't exactly break new ground that was left to the bundled software to achieve. What. was interesting though was the way the system complete with 5-inch monitor, twin disk drives and detached keyboard — was packed into a luggable 24lbs box. The keyboard is disappointing. There are no function keys, just a straight alphanumeric QWERTY layout with a numeric keypad; also, the connection to the computer isn't really long enough to make it truly detached.

The integral monitor is simply not big enough to support the normal 24 lines of 80 characters: it acts as a 24-line by 52-character window on the internal display - if you see what I mean. The software bundled with the 01 supports this scrolling window very effectively indeed. Later versions of the machine are offered with an 80-column screen but you need pretty good eyes (or an external monitor) to cope.

The CP/M implementation suffers slightly as a result of the puny 100K per disk storage capacity and in fact later machines are offered with double density drives; it really does pay to check exactly what you're buying very carefully indeed. Because of the requirement for a memory mapped screen (so the scrolling can be achieved) the user only gets 54K for applications programs. The swapping between system ROM and 0 knocks the speed of the machine down slightly, but not enough to cause any real problems.

On the I/O front the machine supports a serial port for modems and the like, as well as a parallel port. This can be configured for either Centronics-type printers or, somewhat unusually, as an IEEE interface. Blank looks are expected at this point but the jargon simply means that the 01 can be used as a dirt cheap scientific computer.

Adam Osborne described the overall design of the Osborne 01 as "plain vanilla variety". And in many ways that's no bad thing in these days of custom gate arrays,

ULAs and VLSI chips. Software: Any user unsatisified with the packages that come with the machine - and you'd have to be pretty fussy for that to happen - will find that virtually any standard CP/M package will run on the Executive. The smaller screened 01 works best with software tailored to its scrolling window system and there's still a reasonable amount available. Software support for the 01 has tailed off since Osborne went bust in America, but the products that come with it are fully supported and there is a reasonable choice of alternatives. Where the machine is going to be used as a stand-alone computer, rather than as a portable, it's probably safer to go for the more expensive Executive. Market sector: As the original business portable machine to come supplied with bundled software, the 01 (and to a lesser extent the Executive) have already taken their slice of the available market. Following the US collapse and its subsequent down-pricing, the machine now also appeals to the growing home/business sector and even looks attractive to the serious home user. Quite how long this momentum will last may well be determined by the remaining stock of machines. However, for anyone wanting a CP/M based portable plus industry standard software, this has to be the machine to buy. provided you can get a castiron guarantee of service. Support: Despite the demise of the American parent the machine is still pretty well supported - although there's little you can add to it. Future plans include the release of an IBMcompatible version during 1984; there's life in the old dog yet.





Osborne 01: The portable that led the way; the collapse of the US parent company raises question marks.

The QL story is in essence the story of its bundled software. Psion, the company which wrote the packages, has always had a close relationship with Sinclair Research – being responsible for some of the more hardy top-sellers on the Spectrum, including products like *Vu-file* and *Vu-calc*.

Members of the *QL User* team have been using the four programs for some time, testing them to breaking point. And the conclusion is that once Sinclair and Psion do get round to delivering the QL in large numbers, the machine and its software are likely to have a profound effect on the market.

The first thing to realise is that the QL is effectively an engine for running the four packages; it's almost as if the hardware has been treated with the contempt it deserves. Sinclair obviously began by deciding the jobs it wanted the QL to do; it figured out what software it would need, and then designed a minimal cost machine to run it. The QL, like Apple's Macintosh, is an 'appliance computer'; the fact that it will also turn out to be a leading generalpurpose personal computer is almost just icing on an already appetising cake.

Psion's packages are serious business software – not toy programs like *Vu-file* or *Vu-calc* and the majority of 'serious' programs running on the Spectrum, BBC and CBM 64. They would be better compared with the likes of *WordStar*, *dBase II*, *Multiplan* and so on. As you'd expect, they cover the '3Rs' of microcomputing – wordprocessing (*QL Quill*), spreadsheet (*QL Abacus*), and database (*QL Archive*) – with the addition of a fourth for business graphics (*QL Easel*).

### THE MICRODRIVES – MASS STORAGE OR MASS HYSTERIA?

But of course, for only £400 we can't expect everything to be perfect. Sinclair's cost-cutting methods took away the chance of a 'real' disk interface and instead two of Sinclair's own Microdrives were built in. The company reckons that it has availability and reliability problems sorted out, but if the Microdrives don't prove dependable, the QL's potential will be decimated at a stroke. But then there's another problem: even if they do actually work, a limited storage of only 100K on a machine which promises expansion to 500K seems even to a novice to be rather inadequate.

Access will be slow of course – but not slow enough to even cross the minds of the newcomers to the QL. Performance is boosted by relying on the vast amount of RAM available – 128K in a basic machine, with 500K of non-wobbling RAM packs promised for later. Psion's packages run entirely within memory – there's no 'disk swapping' or overlays. Data is also kept in RAM where possible – providing limits of around ten pages on a single wordprocessed document. However, if you

## THE APPLIANCE OF PSION

The four software packages that come included in the price of a QL lift a reasonably exciting machine up into the serious league – allowing the system as a whole to stand comparison with other, more expensive combinations. Max Phillips and Peter Shaw put Quill, Abacus, Archive and Easel under the review spotlight.

exceed RAM storage with, for example, the database, the QL will obligingly use the Microdrive.

### THE PSION PACKAGES-BUNDLED OR BUNGLED SOFTWARE?

From the start, Sinclair's QDOS promised to be multi-tasking; however, we at QL User have yet to find out how to get two or more programs running at the same time - as seemed possible at the launch. One other aspect pushed heavily at the time was the windowing facility. The QL's windows are not true windows-forthatyou'dneedalotmore complicated hardware than the QL's budget could ever stretch to: software is not enough. The packages that Psion has so labouriously worked on over the past nine or so months are stand-alone programs; with QDOS changing so many times both before and after the launch, they simply had to be. The packages won't sit together in memory and there is no instant communication between them. However, Psion does provide for some integration by having a defined import/export ability in each program, using a common file format (identified by an EXE extention).

Obviously this is adequate for the odd report and so on, but it does preclude frequent and regular passing of data-for example, instant graphing of a spreadsheet. It's also worth noting that it's only 'raw data' that gets moved across, rather than a Lisa-like clipboard facility where the whole finished product can be dropped into another program. Export a graph from QL Easel into QL Abacus and you get a block of cells full of numbers with no apparent meaning! The other potential disappointment with the import/export ability is what appears to be some unfair restrictions on moving data in and out of QL Quill

All four programs share roughly the same layouts and command structures, the screen being divided into three areas. Across the top is a control area (or 'prompts box'); the central section is used for data display, and a few lines at the bottom provide status information for such things as current mode, memory remaining, current file name and so on.

The 'prompts box' is a neat device for hand-holding the user throughout the operation of a package. It serves both to tell the user what can be done next and to confirm actions as the user does things. The area is divided into a set of boxes, some with 'static' help information, others with 'dynamic' messages that follow the user as he or she works. For example, like most spreadsheets, *Abacus* lets you enter formulae or text straight into the current cell. The prompts box shows:

### DATA & FORMULA enter directly and press ENTER and

### TEXT type " followed by text and ENTER

As you type, the relevant box is highlighted in green, confirming that *Abacus* is taking your keystrokes as you intended.

Psion has made more use of colour than you might expect. The packages run in four-colour mode – the colours used being black, red, green and white; often the different colours are used to highlight data (such as bold text in *Quill*). While the reliance placed on colour may make life a lot easier (it's certainly nice to see it being taken seriously), there may be problems for users with monochrome monitors.

The function keys and cursor keys have reasonably standardised functions; F1 always provides help with whatever you're doing at the time; F2 toggles the prompts box on and off for those who can do without - or just temporarily want a larger display area for checking final results; F3 invokes a list of commands in the centre of the prompts box. A single keypress then writes the name of the command on an input line above the status area. If the command needs any parameters, it prompts for them on the command line. Once you've built up a complete command, ENTER executes it.

The escape key always aborts any incomplete action. And every package has an identical line editor under the control of the cursor keys – the arrows move by character or word, deleting if used with the Control key. **BACUS** The spreadsheet which challenges the might of multiplan.

The spreadsheet of the family is Abacus, which provides a sheet of 64 columns by 256 rows. In addition to everything you'd expect from a bog-standard spreadsheet, it has an impressive cell labelling system, windows, and an unusually large number of text handling functions.

Any text in any cell on a spreadsheet is potentially a label. If you use a text label, Abacus will find the cell and then intelligently deduce which cell it refers to. For example, put 'Costs' in a cell followed by a row of numbers and Abacus assumes that 'Costs' is a row label. Put 'Jan' above a column of figures and it becomes a column label. What's more, where row and column labels cross each other, the intersection cell has its own unique name. In the example above, you'd probably have a cell which could be referred to as 'Costs. Jan'. A naive user would probably take this for granted, but as a system it's come a long way from traditional cell coordinates like A1, C13 and so on.

Abacus provides more than the usual share of text handling functions and some can have startling results. Consider the following command:

### Row=Month (Coll ())

Coll() returns the current column number. Month is a text function which returns a month name. So the command causes the month names (which automatically become cell labels) to instantly appear across the top of the spreadsheet.

Other text functions will be familiar to Basic programmers; CHR and CODE for ASCII conversion, INSTR for text searches, LEN for length of text and so on. *Abacus* will also fold cases (LOWER and UPPER) and sort either numerically or alphabetically (ORDER).

The screen can be divided into two windows, either horizontally or vertically. When you open the window, you can opt to link the two windows together so that moving one moves the other the same relative distance.

Psion has bold claims for the performance of Abacus-for instance that it's faster than Multiplan. Although we didn't try the customary large models. Abacus was definitely snappy enough on small jobs; it could easily emerge as a bit of a trend setter. The level of text handling is such that it wouldn't be difficult to use the package for simple data management jobs, as well as more run-of-the-mill spreadsheet work. In keeping with the QL, Psion has produced a widely appealing package rather than one of specific interest to accountants.



Abacus is the spreadsheet package of Psion's 'fab four', and above is what you'll see once the program has loaded; all the cells are empty and the 'current cell' cursor is pointing to cell A1. The rows of *Abacus* are numbered from one to 256 and the columns are labelled from A to BL, which gives a total of 10,404 cells more than enough for most applications.



**3** One of the many 'help' pages provided with *Abacus*, this one dealing with the formulae associated with the package. The use of formulae is very handy as you can fill, change and generally manipulate whole rows, rather than having to perform the time-consuming task of altering each individual cell.



**5** Formulae are a very useful way of manipulating *Abacus*; here you can see the way one row is being related to another and then altered accordingly. Once the first row has been inserted 'manually', you can calculate the rest of the rows using something like 'row=magazines.january\*1.02'. This will change the first value in the row and thus carry on the alteration throughout.



**7** Here the columns are being calculated the costs. Figures can be displayed in a variety of formats on *Abacus* via the 'view' command. In the above screen shot, they're shown in a 'monetary' format, i.e. a '£' sign to two decimal places. Other formats not shown but equally viable are in terms of percentages, standards, etc.



2 Here, the rows have been given names which are associated with our mythical 'corner shop'-such as 'Tobacco', 'Confectionary', etc. — and the title 'Corner Shop Sales 1984' is shown in the top left-hand cell. (If you find the names are too long you can alter their size with the 'width' command.) All rows can now be identified with the name allocated, which makes things a lot less confusing.



On-screen, you can now see that the columns have been labelled with the months; this was done using a pre-set function which is used in the format 'row=month(col()-1)'. If you look at the bottom line of the screen shot, you'll see another formula being entered - this time using figures.

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0004 00			the co	nes)
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£368.66	£379.84	£390.41	£402.12	£414
£357.88	£263.16 £367.71	£268.42 £378.74	£398.10	£481
£1517.88	£1549.25	£1582.31	£1616.28	£1658
£423.88	£427.23	£431,58	2435.82	£448
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6 The number at the start of the row is being altered; this is done by simply positioning the cursor over the figure to be changed and typing in the new data. This alteration, as has already been explained, will cause the rest of the row to be changed accordingly. As you can see from the above screen shot, the file is nearing completion.

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Constant inners		(168.48	2279.84	12383.41	4482.12	- 24
Nogazines -		2279.88	2283.56	(289.23	5295.82	
Heuspapers		557.88	5367.71	£379.74	2399.10	648
Total turnover		61507.88	61569.65	11683.12	£1637.42	0167
Emendi ture						
Stock		1423.88	4427.22	8401.58	1405.32	644
Rent		1488.88	1460.80	2488.88	2488.88	- 648
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Tac		1158.48	1158.88	1158.88	£158.88	115
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On-screen, we now have the completed spreadsheet ready to be dumped to a printer, saved to Microdrive or exported to one of the other Psion packages. In the above example, the file is to be exported to *Easel* so that a graphical image of the data can be achieved; exported files are saved with a common suffix (\_exp).

## Amazing how played out some things



### become.

# Will you think the same of your micro in 6 months' time?

Remember the days when every record player was gifted with a needle instead of a stylus. 45's were "in," 78's were "out."

Before the days of hi-fi and laser discs. When a graphic equaliser was a breakthrough on the football pitch instead of in music technology.

Look at a record player now and it's a museum piece.

It's like that with micros too. The machine you thought would give endless hours of fun and interest often becomes a five minute wonder. Played out within months. Or so you thought.

But imagine communicating with other micro users on a nationwide mainframe system. Updating yourself

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daily with the very latest computer news and reviews. Paging a special Bulletin Board. Feasting from "Prestel's vast menu. Even downloading a choice of software *absolutely free*.

In fact, imagine 30,000 pages at your fingertips and you've imagined what it's like to be on line with the Micronet 800 system.

For Just £13 a quarter (and, for most of you, a local telephone call whenever you want to connect up) you could subscribe to the Micronet system.

The only extra you need to connect up is a modem unit. Which is a small enough outlay for what it buys.

Micronet's features are almost limitless and constantly updating so why not see it in action at John Lewis stores, selected W. H. Smith shops and Spectrum UK dealers.

Or fill in the coupon for our brochure. You'll find you won't want to play on anything else.

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### Making the most of your micro.

A database language that's simple, approachable and serious.

Data management comes in the form of *Archive*, a full programmable database package (and not a misnamed file handler like so many other home packages). You can write complete data management applications in its own *bona-fide* programming language or just use it as a simple card index, with a handful of simple built-in commands. So *Archive* combines both a simple, approachable system with a serious programming package.

It's a record and field based filing system but, unusually, it's built around variable length records. This relieves the user from precalculating field lengths and optimises memory usage. The system is obviously fast enough with RAM-based data although it remains to be seen how well it will perform when there is enough data to force *Archive* to use the Microdrives. Records are presented either in default straightforward listing or by using a user defined screen layout.

Archive's real strength lies in its programmability. It has a complete language coupled with its own intelligent editor; it lists the currently defined procedures by name, supplies 'proc' and 'endproc' for new ones, indents listings and so on. After a procedure is defined, it becomes a command just like any other of the commands available and can, of course, be called by other procedures. So complete applications can be built up in a simple manner. This method has rather a lot of ties with Forth. Although the language may be completely different, the theory of building new commands from combinations of others is exactly the same.

Included with Archive is Vu-File's old protege, Gazetteer. For those who havn't encountered this old and well loved file, it records the countries of the world, their population. capital, continent, currency, language and land area, etc. Archive is, unfortunately, the only one of the Psion programs to include a demonstration file.

Not so many months ago, it was unheard of for database packages to be running on anything less than CP/M systems. But *Archive* is not alone, for packages such as Audiogenic's *Magpie* for the Commodore 64 offer a similar sort of programmability and usability for not many more pennies. *Archive* at first sight appears to have the upper hand because of its multi-file abilities and vast language, but how it will fare in practice remains to be seen.



**1** Portrayed here is the loading screen of Archive — something you're going to be seeing a lot of; although the manual insists the packages take "a few seconds" to load, it can take up to five minutes to get something useful from any of these four packages. Archive is the file creation 'language' — in that it uses commands such as 'open', 'create', 'new', etc. — and as such can be regarded as one of the 'true' databases.



Included with the Archive package is the Gazetteer file, which is much the same as the original card index file on Vu-File — Psion's successful program for the ZX Spectrum. In this screen shot, the file has just been 'looked', 'displayed' and 'nexted' — the 'look' command loads a file but doesn't allow you to change it, 'display' shows the first file in the database, and 'next' flips on to the ensuing file.



**5** As in all four of the packages, hit the F1 be interpreted as a cry for help. Here we see the initial page of help for users of the *Archive* package; if you want more in-depth information, then a follow-up list of 'help' pages is available. All four packages from Psion contain this comprehensive tree of helpful hints.



Another of Archive's powerful commands is 'search'; it can be seen in the above screen shot being used in the format 'search currency="E"'. Search is used in a different way to the more broad command 'find', in that you can specify in which field Archive should begin to look. Please note that the ERROR message at the bottom of the screen is not a product of Archive's inefficiency — it has more to do with bad spelling!



**2** Ready and awaiting your commands, the Archive initial screen displays a prompt box containing some of the commands available; there are other commands as well but they wouldn't fit in the space allowed. The screen shown here is split into two separate parts, excluding the prompt boxes; the bottom of the screen is used as a typing area, and the central part of the screen is left for display purposes.



**4** The command 'find' can be used to ask **4** Archive to display a specific file. Here it's been commanded to find the file entitled 'france', and in the central display area France has indeed been displayed. To try and catch the package out, you could have typed 'find ''Paris''' — but the result would have been the same; Archive, having checked through its files, would find no other reference to 'Paris' other than in its French file. Voila!



6 Our quest, illustrated by the above screen shot, is to find out what the 'time' command does; having delved into the 'help' pages, this is what you get. It turns out that it returns the value of 'dates' in the format 'hh:mm:ss'. As you can see, there is ''no additional information'' — so that's your lot! To get back from the 'help' pages, you can either keep pressing Enter or key Escape.

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>display >last Yaiter		

**B** Existing files can be changed easily using the 'alter' command. Here onscreen you can see the famous country 'Q-Land' (what do you mean, you've never heard of it?) being updated. By manoeuvring the cursor around, textual messages can be positioned anywhere on the screen. Just find the right spot using the cursor controls, start typing and press Enter ... simple as that! **TOLL** A business graphics package which could set the standard rather than follow it.

Far and away the most visually exciting of the programs is Easel. This is a standard business graphics package with the exception that it's so approachable, you can boot it, type in a string of numbers and you get a bar chart instantly, before your very eyes. Easel copes with bar charts (vertical, horizontal and stacked), line graphs and pie charts -all with a variety of style options to provide a massive range of possibilities. Included in Easel is a user-definable bar, so if you don't like any of the many styles that Psion has so carefully chosen, you can make your own with a choice of background colour, border colour and border thickness.

It's based on named sets of numeric data. Once a data set is in memory, you're free to graph it in any way you like, including mixing it with other sets. The numbers in the current set remain available for editing and additions, so it's easy to try out and construct a whole series of graphs based on the same raw data. Easel will generate new sets of data for you, based on applying a calculation to existing sets. The classic example would be to create a graph for profits of the year with 'Profits=sales—costs'. This is a similar function to the Abacus way of creating whole rows and columns of information based on the other information stored in the spreadsheet.

There are all sorts of ways of tidying up the presentation; labels and legends can be moved around at will and colours can be changed – as can fine points of detail such as the grid behind the graph, deciding whether the line graphs are 'filled' to the axis, whether bars should have solid outlines, and so on.

All of the graphs reformat if the data entered is too big for the present graph size, and a menu of all the graph types can be shown by example on-screen by pressing F3(commands), V(View) follwed by ? and enter. This draws all the graph types for varying bits of information. Another useful function is the COPY command which does a hi-res copy via the RS232 to the Epson FX-80;

Apart from the luxury of automatically calculating new data sets, *Easel* doesn't produce anything beyond existing packages. What is pleasing to see, however, is the ease with which quite complex graphs can be built up. The speed of response encourages a 'suck it and see' approach with the user merrily trying out all kinds of possibilities – which in itself is enough of a stimulation to have its own rewards. Of the four packages, *Easel* was the most satisfying to use



As soon as the business graphics package, *Easel*, has been loaded you can begin typing your data in. *Easel* moves the cursor automatically on to the next column; if necessary, the columns are re-scaled to allow the data to fit. The labels for the columns are set to default on the months of the year, each abbreviated to three letters. This particular screen shot shows the turnover for 'corner shop' being typed in.



**3** The 'view' command will display data **3** sets in whichever format you please. Here the *Easel* has been commanded to display all the current data sets with format '0' — which means that the profit, turnover and cost is shown as a standard bar chart. The key to the chart is added by the program itself, automatically; it can be moved to a different part of the screen if it's obscuring something.



**5** Should none of the pre-defined bar styles suit your particular purpose, *Easel* offers you the option of defining one of your own. There are three characteristics you can change: the Fill colour, the Border colour and the Border thickness. The up/down cursors are used to select your choices; if your variations involve changing the colours, then check out the options offered.



2 You can store more than one set of data tables at once — here the costs of 'corner shop' are displayed. At this stage, having the costs and turnover of 'corner shop', we could ask the package to create and display the profits simply by typing 'profits=turnover—costs'. Ease! will then display the new table and wait for your next command.



If you're not that impressed with the d bar chart given, you can make your choice from any one of 16 pre-defined bar styles. To choose a particular style of bar, press the left/right cursor keys until the cursor settles on the bar you want, and then press Enter. The chart will then be re-drawn and displayed on-screen. You can also alter the background grid of the chart.



**6** This screen shot shows the use of user-defined and pre-defined bars to highlight different aspects of a chart. As well as being able to alter the style of the background grid and the position of the key, it's also possible to change the titles of the axes and their size.



**7** You don't have to stick to standard bar charts — take a look at this screen shot and you'll see a small selection of the formats available. This is the 'choiceby- example' page and it details all eight of the basic figures. Six of the examples given show the various kinds of bar chart, the other two are of a line graph and a pie chart.



8 This last screen shot displays a pie 6 chart of the 'corner shop' turnover. This format is the slowest of all *Ease*'s charts; first the Microdrives have to be accessed and then the chart itself is drawn at a rate of micrometers. Apart from the amazing speed at which the pie chart is accomplished, the effect is by far the most satisfying — an important user consideration.

### The wordprocessor with a touch of class.

The wordprocessor, Quill is everything you could reasonably ask for. It has a high degree of onscreen formatting (including visible page breaks, justification, bold and underlining) and a complete set of editing features.

Text is normally inserted at the cursor position – characters moving up and being reformatted to accomodate the new text. Rather cleverly, if you type in more than a handful of characters, *Quill* then automatically splits the line and opens up the gap for the insert.

A ruler line controls basic formatting, with left and right margins, an indent margin and a full four variations of tab stop – centre, left, right and decimal. The indent margin is used as a left margin after any carriage return – that is, at the end of any paragraph.

The qualities of *Quill* are manifold, but the one that Sinclair Research itself pushes strongest is the 'whatyou-see-is-what-you-get' feature. This means that if you want a word to appear in bold on the final document, it will appear in bold onscreen. *Quill* does this trick with every output format command it has; for instance, underlines, subscript text and page breaks are all shown. This appears to be unique to Psion's package.

Quill has a glossary function where short and frequently needed phrases and commands can be stored under each of the alphabetical keys. To define a glossary you hit SHIFT/F5, the letter key to be used for the text itself, followed by F5 again. From now on pressing F5 followed by the letter key will produce your text.

There are two block commands, Erase and Copy. Erase lets you mark the beginning and end of a block of text by moving the text cursor and pressing Enter. The text is immediately deleted. Copy lets you mark the text in the same way and then move it into the position of your choice. At this point you can decide whether you want to keep the original block (effectively a copy), or delete it (effectively a block move).

While actually running Quill, the first thing you notice is its speed. Typing is sluggish, the program is continually checking for justification, and although it has a buffer touch, typists may find they are too fast for Quill.

But Quill has all the basic ingredients and should prove sufficient for most users. It's not over-specified – particulary in comparison to most CP/M and MS-DOS wordprocessors – but then again, it's good enough to do almost everything buyers will want of it.

				-
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Although a very user-friendly package, you'll find you spend a great deal of time wading through the 'help' pages trying to sort out the amazing things you can do with this wordprocessing program. For instance, as shown by the relevant 'help' page above, it's possible using the cursor keys, to move the document you're preparing around on-screen; this isn't at all apparent from the standard *Quill* screen.



**3** Once you've typed in your document on-screen, you can highlight certain areas of text in bold or high script using the facilities of the F4 key (Typeface). In the screen shot above, the manager of 'corner shop' is ordering her essential copies of Your Spectrum, Your 64 and QL User. The whole document will not quite fit on-screen, but can be scanned easily using the cursor controls.



**5** As on most other wordprocessors, **6** Quill has the facility of a set of justify commands. Here we see the use of 'centre justify'; you can also justify text left and right. Text justification is carried out by positioning the cursor at the start of the text, pressing the F3 key and the 'J' key, and then the 'R', 'L' or 'C' key (depending on whether you want right, left or centre justification).

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The 'design' command is useful in that 7 it allows users to alter the displayed format of the document on-screen to one which better pleases the eye or — on a more practical note — coincides with your printer. Factors that can be altered are the margins, the width of the lines, the gap between each line, the start page number, the colour, the page size and the upper margin of a document.

### H1CR00810

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- When is a CONTRINC you may change the carteidan in Riccord (or 1 but goes should register it at the and of the CONTRINC, This may be reserved to 1000, SNUS, NEXCE, PRINT, INPORT, FORMET, NEXCE and DIFFE.
- In SAUE and ZAP COMMANDS you may, when the prompts say, change the cartridge in Alcondrive 2; again it must be replace at the and of the command.
- **\***

2 Moving further into the 'help' pages, information can be found on the Microdrives; if you're at all worried about saving that important document to Microdrive, look no further than these pages, because it's all there. All commands in the 'help' page can be obtained by typing just the first letter well, it saves time.

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**4** Guill has the ability to allow the user **4** to 'paint' existing text with bold, underline, high script, etc., and here this facility is being used to underline the reference number to 'corner shop'. When you've finished 'painting' text — which is shown visibly on-screen — keying Enter gets you back to 'insert text' mode, ready to start typing again.

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Sincer Sincer	nordinand and have been dear allowed and been dear allowed and been dear allowed and be
	25 capilas Visur Spectrum Lissue 5 36 capilas Visur 64 Lissue 2 158 capilas 38 deem Lissue 1
	eer deidefulig
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Semanti darida 1995.) Filialari	Senders) (June : 1) / 2005 / 1 N 199016917 - no name

**6** This screen shot shows how the **6** 'Yours faithfully' section at the end can be justified to the right, even though the rest of the text is centre justified. Notice at the bottom of the screen that *Quill* informs the user of the present mode, typeface, line number, page number, document number and word count; the last item is especially useful for those thinking of writing for future issues of this magazine!



This screen shows the final copy of the 8 letter before it's sent to the printer. The manager's name is shown in bold (highlighted in white text) using the Typeface command, and the prompts box has been removed so that the whole of the document can be viewed on-screen; this has been done using the F2 key.



# THE PSION WRITERS

The QL story is the story of its bundled software, and the Psion packages supplied with the QL have, despite a few teething problems, been generally well received by the reviewers. Surya asked the four authors what they'd set out to achievetalking to Charles Davies (Archive), Martin Stamp (Quill), Martin Brown (Easel) and Colly Myers (Abacus).

The QL's 'free' software packages together provide the four most common areas of business application – wordprocessor, database management, business graphics and financial analysis. And yet for the company writing these programs, this was its first real foray into the cutthroat world of business software. Charles Davies, Psion's technical director and author of *Archive*, explains how Psion managed to win the contract in the first place.

"Sinclair contacted a number of companies at the beginning of 1983. At the time, they were extremely vague about the machine just that it would 'probably be 16-bit'. They invited us to submit proposals for a suite of business software."

Psion has apparently already made the decision to move into the business market, and was working on four packages. "Since we'd already given the matter a lot of thought, we were able to give Sinclair detailed proposals, which they accepted."

Psion is not a company noted for entering into contract work. So what in particular swung them into taking on a deal with Sinclair?

"We weren't given detailed specifications by Sinclair" replied Davies, "just asked to submit proposals for a suite of business software. Since we'd already done our own research, we just gave Sinclair a set of proposals based on what we were doing at the time."

At the beginning, Psion knew nothing about the machine at all – not even what the processor was going to be. Davies, however, doesn't feel that it was the handicap it might at first seem. "The development work was done on our VAX systems," he explained. "Since the packages are written primarily in C, it didn't particularly matter which processor was chosen."

Psion owns two VAX superminis, which the company uses to develop most of its software. The attraction of carrying out development work on a VAX is clear enough; why work on a home micro with a poor keyboard and no debugging software in assembler, when you can work in a professional programming environment in C? And - perhaps equally important in an industry where it seems almost common practice to launch first, design later - you can actually develop software before the software develop before hardware exists.

Sinclair has stuck by his muchquoted statement that he was not aiming for a specific type of user, and that "the market will decide" where the QL's future lies. But was Psion given an image of the typical user? "I suppose you could say we were given the 'granny in a sweet shop' image of the user," says Davies. "The packages had to be easy to use for someone with no experience of or interest in computers. The whole emphasis was on sitting down and using the packages from day one - without needing to refer to the documentation. We all know the 'if all else fails, read the manual' attitude; we tried to work with this attitude instead of against it.

"We've provided substantial 'incontext' help facilities in all four packages. The prompt box at the top of the screen tells you exactly what you can do at any time and provides brief prompts. And the in-context help "Anyone can have the Abacus package up and running within a matter of minutes."

"The main problem with Quill was space; we wanted to cram

a lot of features into a

small area."

screen can be called for more detailed instructions."

Using a VAX for development work is all very well, but there's a limit to how much work can be done without the target hardware. How long was it before Psion received its first QL? "We were given a rack system in the summer of '83," Davies says. "This had no Microdrives, of course, and we still didn't know exactly what the keyboard would be like. But in all "With Archive, we've sacrificed some of the more obscure features for the sake of simplicity."

> "With Easel, you can type in a few figures and instantly see those figures displayed as a barchart."

TONY SLEEP

"We didn't receive a copy of QDOS until a few weeks before the press launch in January. We had the choice of writing our own operating system to work with, or waiting for Sinclair to produce QDOS. Knowing it would be foolish to wait for Sinclair to produce QDOS, we developed our own operating system for development and testing, substituting QDOS when it arrived."

other respects the system was a QL.

We now know that at least some of the delays in producing the QL were caused by hardware problems. But some have said, too, that there were bugs in the Psion packages.

"The Sinclair hardware was delayed, so we used the time to improve the specifications of the software. There were a lot of different versions of both the hardware and the Psion packages, and this caused problems of compatibility. But the versions which have gone out to customers are fully working."

### **Archive: Close To Basic**

Switching to the individual packages, the database program, Archive, seems noticeably different from the other three. Quill, Abacus and Easel are all very easy to use from the first few minutes of sitting down with a QL. Archive seems less friendly.

"With the three other packages,"

### EVOLUTIONISTS

### THE PSION WRITERS

Davies explains, "our prime concern was ease of use. In some areas, we've sacrificed some of the more obscure features for the sake of simplicity. With the database, however, we found from talking to experienced users that what they want is power. For this reason, we decided on a languagedriven system. This is inherently less friendly than a menu-driven, singlekey system, but provides the sophistication that we know users want.

"The Archive programming language was designed to be as close to Basic as possible; if users know any programming language, they'll know Basic."

Given the similarities between the *Archive* programming language and Basic, I suggested to Davies, why not simply let users program the database using SuperBasic?

"The Archive programming language is much easier to use. It provides full prompting and in-context help at all times. You also get a lot of dedicated commands, like automatic sorting. There's a full editor, though you could of course use *Quill* if you prefer. Basic programmers will find very little difficulty with *Archive*, but we have to cater for inexperienced users too."

If the packages were originally intended for a business system, with disk capacities of perhaps 400-800K, one could see the 80-100K capacity of the Microdrive cassettes limiting the program's efficiency. I asked Davies how Archive would cope with the low storage potential.

"We've used variable recordlengths. This dramatically improves efficiency, and is also easier for inexperienced users to cope with; they don't have to predefine record lengths."

It's clear that much as the Psion packages are aimed at inexperienced users, the QL has also attracted a lot of interest from hobbyists. Does Davies see the QL as a programmers' machine?

"I don't see the QL as an enthusiasts' device; it's being marketed as a 'plug-in-and-go' system, and this is where I think it will make its impact."

### **Stamp On Quill**

Perhaps the most important package in the suite is the wordprocessor, *Quill*. While not everybody will be impressed by the benefits of holding one's address book in a database, or balancing the cheque book with the aid of a spreadsheet, almost everybody can see the advantages of a wordprocessor – even if it's used only for writing letters. I asked *Quill's* 

author, Martin Stamp, about the problems involved in writing the package.

"The main problem was space; we wanted to cram a lot of features into a small area. With the relatively slow speed of Microdrive access, we couldn't rely too much on overlay files. The bit-mapped screen presented both problems and opportunities. The slow speed of writing to the screen meant that we couldn't subscribe to the 'when in doubt, redraw the screen' school of programming. We had to keep track of what was on the screen at any given time. But it has its enabling us to compensations, display underlining, superscripts and subscripts and so on."

"I suppose you could say we were given the 'granny in a sweet shop' image of the typical QL user. The packages had to be easy to use for someone with no computer experience."— Charles Davies

*Quill* has been criticised for its lack of features. For example, once in block mode, you have to use the cursor keys to define a block of text. This is a very slow method of defining a large block of text. How would Stamp answer these criticisms?

"The emphasis throughout the wordprocessor was on ease of use. We didn't want lots of complex features that nobody ever uses. You won't find a paragraph-delete function, for example. It would be too much power; people can go terribly wrong that way.

"Block definition is achieved using the cursor keys so that users can see what they are doing. Experienced computer users are quite happy with abstract concepts – they know that the block has been defined, even if they didn't see it happen. But when a beginner does something, he wants to see it happen. That way, he's sure."

Quill takes a long time to load, and it seems to rely heavily on overlays. Aren't users going to become impatient with delays caused by the slow speed of the Microdrives?

"The overlays can be overcome through code-compression," Stamp replied. "This will also reduce the loading time. The only package which

relies heavily on overlay files is Easel; on the other packages, I think codecompression will eliminate them altogether." So does that mean all users will be issued with free updates when the code-compression is complete? "The versions of the packages that are being issued at the moment are the final versions. We will be producing updated versions in perhaps six months' time as part of our normal updating policy. These will take account of comments from users, as well as any problems which come to light. It's well known that there are always a few bugs which only surface when users get their hands on the software, but the essentially fullypackages are working. How the updates are issued is for Sinclair to decide."

Some of the more cynical amongst us have suggested that the packages on show at the press launch were just demonstration versions, hastily patched together for the day. Could Stamp confirm if there was any truth in this?

"The versions at the press launch were pre-release. Work was still being carried out on the software at the time of the launch." But how about multitasking? Rumour has it that Psion wasn't told anything about it until the packages were completed – hence the software doesn't multi-task. Stamp wouldn't be drawn: "Multitasking of the Psion packages cannot be supported on the basic QL – there's simply not enough RAM. It may be possible to make them multitask on the fully-expanded model, but there are no plans for this at present."

Quill supports the importing of files from the other packages, but not viceversa. "It's just not something we feel to be appropriate," says Stamp. Does he really see the QL competing with machines like the IBM PC and the ACT Sirius? "Yes," says Stamp, "I think the QL *is* appropriate to business users. "I can see it competing with much more expensive machines."

### **Friendly Abacus**

Psion claims to have gone out of its way to make the four packages both powerful and easy to use. I asked Colly Myers, author of *Abacus*, what that means to a spreadsheet. Isn't it a case of see one, and you've seen them all?

"We feel that *Abacus* is much friendlier than most spreadsheets. There's none of this 'cell D45' business. If you want to refer to the cell containing the profits made in March, you simply specify 'Profits. – March' and *Abacus* will find the cell where the row marked 'Profits' crosses the column marked 'March'.

"As with the other software, *Abacus* is intended to be simple to use. Anyone can have the package up and running for straightforward applications within a matter of minutes. But the more complex and powerful features are there when you need them. And as with Archive, we've used Basic functions wherever possible since these – if anything – will be familiar to the user. So to find the length of a cell's contents, for example, you use LEN. We think that Abacus compares well with traditional spreadsheets in terms of speed and power, but is friendly enough for people to be tempted to use it to balance their bank account."

### **Instant Easel**

The final package in the suite is the business graphics package, *Easel*. While the combination of a database, wordprocessor and spreadsheet has long been the established formula for a business system, the addition to the trio of a graphics package is something relatively new. I asked *Martin Brown*, author of *Easel*, what the product offers that other graphics packages don't.

"Most business graphics packages are 'post-processing' programs. That is, they take data from, say, a database and turn it into a set form of graph or table – and that's it. We wanted to go for a genuinely interactive approach. With *Easel*, you can sit down in front of it, type in a few figures and instantly see those figures displayed as a barchart. If you want to turn the chart on its side, you can. If you want a graph instead or as well, you can do that too.

"To start with, everything is set by defaults. You won't be asked a lot of questions first, you just get the default display. Later, you can change anything you don't like – colours, type of grid, form of chart or graph, and so on."

But how useful is the ability to produce graphs from keyboard data? I put it to Brown: wouldn't most users be importing data from a spreadsheet or database?

"I think it's useful in cases where the user has only a small amount of data to work on," he replied. "You don't want to go to all the trouble of setting up a spreadsheet model, exporting the file to Easel, and then loading Easel before you can produce your graph. Easel has simple spreadsheet functions built-in which allow you to combine different sets of data. Mathematical functions are also incorporated, enabling you to produce sine waves and so on.'

And what of the future? Will we be seeing the four QL packages on other machines? "Yes," says Psion. "We're working on other machines right now." Marketing manager Matthew Gaved wouldn't specify which, but I'd say it was a safe bet that we'll have CP/M and MS-DOS versions before long. I'll also give good odds on the BBC micro as another likely candidate.

And how about QL games software? "We're working on that too," says Gaved, "but we're not saying what."

### THE COMPANY

1

The name Psion is one that's long been linked to Sinclair Research microcomputers. Formed in 1980 by Dr David Potter — a former computational physics lecturer at Imperial College, Cambridge — Psion was one of the first companies to market commercial software for the ZX81.

Psion didn't begin producing its own software until 1981; previously it had simply formed marketing agreements with independent authors. When the company began writing its own software, it produced a number of highly successful packages for both the ZX 81 and Spectrum. Vu-Calc, on the ZX81, sold half-amillion copies, while combined sales of the ZX81 and Spectrum versions of Flight Simulation totalled over one-and-a-half million!

### THE PEOPLE Charles Davies

Charles Davies studied physics at Imperial College, Cambridge. After achieving a First Class Honours degree, he remained at Imperial to take a Ph.D in computational plasma physics under David Potter (who is now Psion's Managing Director). He continued to work at Imperial, as a research assistant in the Plasma group, until he joined Psion in September, 1981. Davies is now Psion's Technical Director.



**Colly Myers** Myers joined Goldfield of South Africa after studying chemisty and economics at the University of Rhodesia. At Goldfields, he specialised in operating systems support, specifically on ICL machines. Myers finally



Mr Psion, David Potter, whose company made such a success in packaging software for Sinclair Research.

Psion sold its ZX81 and Spectrum software directly to Sinclair, for marketing under the Sinclair name. This freed Psion from the burden of having to divert resources into marketing, while still retaining the rights to the software. In late 1982, Psion

joined David Potter, his

half-brother, in setting-up Psion in South Africa. He moved to London in April of last year, where he now leads one of Psion's two programming teams.



### Martin Stamp Martin Stamp studied

mathematics at Claire College, Cambridge, where he received a Second Class Honours degree. After leaving university he worked for Unicef on a short-term contract as a field officer in Bihar, India. He then went on to the London **Business School to** study corporate finance, before joining British Telecom. At BT, he worked on assessing the quality of exchangeconnection forecasts: the Basic program he used to assist in this has now been implemented nationally. Stamp then worked as a contract analyst with

began work on four business packages, and it's these that were later to become the QL suite of software. The company now plans to release the four packages on other machines, and is currently working on games software for the QL.

Communications Software. He joined Psion in October, 1982, as a software project leader.



Martin Brown studied physics at Imperial College, London, and then spent a further year on advanced mathematics at Cambridge; he subsequently returned to Imperial College to take a Ph.D in physics. He remained at Imperial College as a research assistant, working in plasma physics and space theory on a Cray 1. In May, 1983, he ioined Psion as a software project leader.



# KEYNOTESOF SUPERBASSIC

SuperBasic is certainly streets ahead of any Sinclair Basic that's gone before, but as for the 'Super' — well, without doubt its structure and graphics are excellent. Andrew Pennell mulls over some conclusions as he explains all the QL keywords.

To call itself Basic, a language has to have certain bog-standard commands, the most rudimentary of which are RUN, LIST and CLEAR. It's hardly surprising, for instance, that on the QL, RUN starts a program, and allows a line number to follow it (though that's not the case, for example, with the BBC Micro. Also, LIST may be followed by a stream number (you'll see later what that means), a start number, and a finish number - separated not by the standard comma, but by the word TO. Any or all may be omitted, the defaults being stream 2, starting from 1 and going to the last. And the ludicrous ZX limit of 9999 is no more, replaced here with the much more useful 32767. And lastly, CLEAR not only removes all variables, but also tidies up any loose QDOS areas that may be lying around; it cannot be followed by a number (a la Spectrum) or a hash (a la Interface 1).

Other stalwarts are the famous trio READ, DATA and RESTORE, and as the QL allows a certain amount of variable type mixing (coercion), program debugging is likely to bring on a head ache.

String arrays can either occur in the non-standard Spectrum way, with fixed length, or can be used with varying length. Another Sinclair first is that string arrays can have long names for example LONGNAME\$(10, 10). The FOR statement can be used in the normal manner, but also has some most unusual and powerful applications. Instead of simply starting at one value and going to another in steady STEPs, you can jump all over the place, using a line such as FOR DB=1 TO 10,20,200. 2000. However, you cannot change a FOR loop variable value, which makes it difficult to leave a loop neatly.

Another handy feature is that if you follow a FOR statement with other statements on the same line, you don't need a NEXT statement. And if for some obscure reason you don't like NEXT, well, it's 100 percent replaceable with END FOR. The loop variable may be any number of letters long, but it cannot be an integer variable (for example, 1 per cent). Apparently this restriction may be lifted in later versions of SuperBasic. And unlike most other Basics, the variable name is compulsory in the NEXT (or END FOR) statement. The humble GOTO and GOSUB statements are still retained, though apparently under protest. Many feel they encourage poor 'structure' in programs, particularly computed jumps, butformostlong-in-the-tooth Basic and Fortran programmers they are indespensible. Personally I have to agree with the Structured/Pascal/BBC Basic lobby — in part at least; they do make program listing harder to follow, and can be replaced with procedures, functions, and REPeat loops.

Another improved feature of the BasicistheIFcommand.Notonlyisthe ELSE command added to it, but a

At last someone up at Cambridge has looked around at other people's Basics, and included some debugging commands.

whole block of lines can be executed after an IF or an ELSE, ending finally in and END IF. However, when you're trying to match ELSEs and END IFs with the relevent IFs, problems can arise where lines are indented (that is, where there are spaces after the line numbers). Unfortunately, lines such as IF A=2 THEN 200 are not allowed because the GOTO is still compulsory.

The INPUT command is actually almost normal, the only 'oddity' being that the action all happens in the upper screen - as on all machines except (previously) those from Sinclair Research. And normally you wouldn't think much could be done with the LET statement, but SuperBasic has actually improved this humble word. It now allows coercion, which in plain talk means you can mix string and numeric types-atleastuptoapoint.Asaresult, the normal functions STR\$ and VAL are absent from the QL being now excess to requirements. At last the LET is optional, bringing the QL into line with the rest of the world.

Almost as humble as LET is the

PRINT command, and there's still nothing really startling about it. It does offer an 'intelligent space' separator, !, but incredibly, it doesn't offer the TAB function; it's very much a case of six of one, half a dozen of the other. And what about the RANDOMISE command? Well here it simply seeds the random number generator — and cannot be abbreviated; you'll need to beware of the spelling, particularly because of the one-shot syntax checker. The RETURN statement, as used in ending GOSUBs (and others) can be abbreviated to RET, but it always gets expanded to RETurn.

### **Speaking Of Structure**

That's covered the commands that any half-decent Basic ought to have...now we'll move on to those that are of more supplementary value.

SuperBasic is intended to be structured, which effectively means that programs should be 'neat' to look at, and easy to follow. The first structure is DEF PROC (which expands to DEFine PROCedure), a sort of up-market GOSUB. With it you can define a section of program to be a procedure, and give it a certain name. It has several advantages over GOSUB, the main one being that it can use its own variables, so there are no fears of corrupting any variables of the same name which may appear in the rest of the program. How many times have you written a FOR I loop which GOSUBs to a routine with another FOR I loop?

As well as having independent variables, you can also pass parameters to it - without the name restrictions you can get with GOSUB. A procedure must start with a DEF PROC NAME command, to be optionally followed by any number of parameters within brackets. At the end of the procedure you must have an END DEF statement, though you can RETURN from it at any point, as with GOSUB. To use it, you just enter the procedure's name, followed by any parameters, such as WAITKEY 10,"A". If you call a procedure the same as any Basic command, your procedure will be overridden by the internal definition, so beware.

Another structure is DEF FN,



	SUPERBASI	CCOMMANDS
	DEVEL	OPMENT
Program Editing	AUTO	Automatic line numbers
	RENUM	Renumber lines including GOTO
	DLINE	Removes blocks of Basic lines
	EDIT	Edit line in lower window
	CONTINUE	Continue interrupted program
	RETRY	A sort of CONT
General Basic	NEW	Deletes all of program
	CLEAR	Clears variables and ODOS areas
		Assign variables and arrays
	BLIN	Start program from line number
	LIST	List block of lines
	DATA	Marks data items
	BEAD	Beads next item from DATA statements
	BESTORE	Moves start marker of DATA
	DIM	Dimensions arrays
	INPLIT	Enter variables
	PRINT	Send data to screen or other devices
	PANDOMISE	Set random number seed
	DEM	Add remarks to programs
		Adu remarks to program execution
	BBOCBAL	
Pronching	COTO	Goes to specified line
or any milly	GO SUB	Goes to specified subroutine
	DEE DEOC nomo	Stort of procedure definition
	DEF FNUC hame	Start of function definition
		Start of function definition
	END DEF	End of proc of in definition
	ON var GO TU	Multiple GUTU command
	UN VALGO SUB	Multiple GUSUB command
	SELect UN var	Start of SELECT Lines
	=number	Start of each selected area
	IF IHEN ELSE	Conditional statements
	EXIT	Used for leaving loops and procedures
-	RETURN	Leave subroutine or function
Looping	FORNEXT	Simple looping
	REPEAT name	Start of repeat construct
	END REP name	Terminator for repeat loops
	EXIT name	Premature exit of loops
Error Trapping	WHEN ERR	Not implemented
	INPUT	/OUTPUT
General I/O	BAUD	Sets RS232 baud rate for both serial ports
	NET	Set network station number
	OPEN	Open stream to device
	OPEN_IN	Open input stream
	OPENNEW	Open output stream
	CLOSE	Close specified stream
Microdrive 1/0	LOAD	Load Basic program
	SAVE	Save Basic program
	MERGE	Merge Basic program
	LRUN	Load program then RUN it
	LBYTES	Load bytes at given address
1	SBYTES	Saves bytes
	FXFC	Execute concurrent machine programs
	EXECW	As above but waits until all programs that are running have finished
	SEXEC	Saves concurrent machine program
	DELETE	Remove file from Microdrive
	DIR	Print directory of cartridge
	FORMAT	Configure cartridge and erase all files
	MRUN	Load ASCII file as program
	CODEEN M	
Attribute costrole		Select ink colour
ANIMALE CONTINUS	DADED	Select durrent DADED & CTDID
	ГАГЕЛ	

expanded to DEFine FuNction. It can be used in the standard way, such as DEF FN CUBE(A)=A^3. However, if you have a similar line that stops after the ')' then much more complicated functions can be defined, consisting of as many lines as you like. As with procedures, each function can have its own variables, and be passed to any numbers of parameters. To leave the function with a particular value, you enter a RETURN statement and follow it with the desired value of the function, such as RETURN A+B\*3. After all the lines under the umbrella of the function, finish with an END DEF again.

To use it, no FN is needed (as is the case on lesser machies); just apply it like any of the inbuilt functions, such a LET A=2+CUBE(W). But as with procedures, don't try and call it something that already exists in the Basic. With both procedures and functions, the LOCal statement can be used to define its own variables, such as LOCal I,J,A\$. It must always follow the DEFine command, and then it guarantees that any other variables with those names will not be corrupted.

A major addition to SuperBasic is the REPEAT statement, which allows blocks of lines to be repeated easily. To use it, enter REPeat SOMENAME, and follow it with the lines to be repeated. If commands follow it on the same line, they will be the ones to be repeated — or else it will repeat all the lines following it, until it finds an END REPeat statement. For both types of REPeat, the method of leaving the repetition is to EXIT SOMENAME, and it makes life easier if you choose sensible names for your repeat loops. As an example, a loop called GETSTRING is much more understandable than one that's been named XYZ12.

Something that Microsoft Basic has always had — and Sinclair Basic has not — is the ON...GOTO and ON...GOSUB commands. They allow jumping to one of a number of lines, depending on the value of an expression, and at last they've been added. However, the manual scorns their use, as the SELect command can replace them, making for more structure. SELect is like CASE in Pascal - only better - and rids programs of indecipherable IF ...GOTOs. At the start you have a line like SELect ON A1, followed by various lines of the form =xx. What it does is compare the variable in the SELect command with that in the '=' lines, and if they agree then the lines following it are executed - until the next =xx statement is found, or the terminating END SELect. Even better. you can specify a range, using =xx TO yy or simply the keyword REMAINDER, for all other cases. It's a complex command, and Listing 1 shows how it can be used to determine each character code.



### PROGRAMMING

### KEYNOTES OF SUPERBASIC

Although there's nothing that's quite as useful as a machine code monitor, the QL does have a few features to interest the more intrepid programmer. As well as PEEK and POKE, there's PEEK\_W, POKE\_W, PEEK\_L, AND POKE\_L, for accessing bytes in ones, pairs or in fours. 68000 fiends will realise the siginificance of such commands, and will also realise why all but the former fail to work on odd numbered memory addresses. There's also the CALL xx command, for executing machine code, which can be followed by up to 13 parameters. Each parameter is passed into a register, though the exact order of the registers is something I have yet to discover.

At last someone up at Cambridge has looked around at other peoples' Basics, and included some debugging commands in the QL. For entering lines there is the AUTO statement, which can be followed by the start line number, and then the increment which makes entering programs a bit easier, by generating the line numbers for you. Another useful command is DLINE, which deletes lines of Basic, and must be followed by two numbers; these specify the first and last lines to be removed. To separate them, you use the keyword TO and not the industry standard comma. Once you've got some Basic in, the EDIT command lets you alter things, albeit in a pretty crude fashion. However, if you get it wrong the whole line is thrown out.

I feel an award of some sort must go to the public-spirited person responsible for the long overdue inclusion of RENUM, to renumber

Listing 1
Structure rules with the SELect
determine character codes.
1000 FOR I=0 TO 255
1010 PRINT I,CHR\$(I): " is ";
1020 SELect ON I
1030 =0 TO 31
1040 PRINT "a control code."
1050 = 32  TO  47
1000 PHINE a punctuation mark.
1080 PRINT "a number "
1000 = 58  TO  64
1100 PRINT "a nunctuation mark "
1110 =65 TO 90
1120 PRINT "an upper case letter."
1130 = 91 TO 96
1140 PRINT "a punctuation mark."
1150 =97 TO 122
1160 PRINT "a lower case letter."
1170 = 123 TO 127
1180 PRINT "a punctuation mark."
190 - NEMAINUEN
1210 END SELect
1220 NEXT I
I SEVITEAL I

	OVER	Select type of overprinting
	UNDER	Select screen underlining
	STRIP	Select strip colour
Screen controls	MODE	Specify medium/high resolution
Voicen vointiois		Clear part or all of screen or window
		Determine attributes for given window
		Move text europt to character square
		Move text cursor to pixel position
		Nove text to cursor, to pixel position
		Sets character width and height
	BURDER	Put border around window of certain size and
Granhics		Plot nixel in window
diapino		Draw straight line between points
	ABC ABC B	Draws arc between points of specified angle
		Plot circle around point: can also draw ollipsos
		Fill restands between faur points
		Finitectaligie between four points
	FILL	Turn fill function on or off
	PAN	Scroll part or all of window to the left to right
	SCROLL	As PAN but up or right
	RECOL	Redefine on screen colours
Turtle graphics	PENDOWN	Turn turtle on
	PENUO	Turn turtle plotter off
	TURN	Rotate turtle by certain angle
	SCALE	Set scale for turtle graphics
	MOVE	Move turtle forward
	OTH	IERS
	ADATE	Adjusts seconds on clock
	SDATE	Set entire internal clock
	BEEP	Create notes or sound effects
	LOCAL	Define variables for procedures and functions
	CALL	Call machine-code with up to 13 parameters
	РОКЕ	Alter memory location
	POKE W	Double byte POKE
	POKE	
	COPY	Copy files on Microdrive
		As COPY but basder not conjed
	MISTAKE	Stop program with error
		Time delay until key pressed
	WHENERR	Not yet implemented
	WIDTH	No apparent function
	FUNC	TIONS
Arithmetic	+,-,*,/,=	Simple operations
	==	'Almost' equal
	_>,<,>=,<=,<>	Comparisons
	Λ	To the power of
String operands	&	Addition
	INKEY\$	Read keyboard or streams
	CHR\$	Numeric to character
	CODE	Character to numeric
	LEN	Length of string
	DIMN	Maximum size of array dimension
	DAYS	Day in week from clock
	DATES	Vear month date and time
		Concretes constant strings (come as Misrosoft
	ΓILLΦ	STRINGS)
	VER\$	Returns version of machine
		Finde cubetringe from layers stringe
Logio functione		r mus substrings norm larger strings
Logic Idactions		
	ANU	
	XUR	Exclusive-or
	NOT	
Bitwise functions	<u>&amp;&amp;</u>	AND
	(double vertical bars)	OR

FLASH

Select flash on/off

	M	XOR
	(double tilde)	NOT
Maths functions	SIN	Sine (in radians)
	COS	Cosine (in radians)
	TAN	Tangent (in radians)
	COT	Cotangent (in radians)
	ATAN	Arctangent
	ASIN	Arcsine
	ACOS	Arcosine
	ACOT	Arcotangent
	EXP	Exponential
	LN	Natural logs
	LOGÍO	Logs base 10
	INT	Integer part
	ABS	Absolute value
	MOD	Modulus
	DIV	Integer divide
	SQRT	Square-root
	Pl	Approx 3.1415926
	RAD	Converts degrees to radians
	DEG	Converts radians to degrees
Miscellaneous	BEEPING	0 or 1 depending on whether a noise is currently being made
	KEYROW (xx)	Scans keyboard matrix
	PEEK	Read memory location
	• PEEKW	Double byte peek
	PEEK_L	Quadruple byte peek
	RND	Random number
	EOF (#xx)	1 if stream has reached EOF status, else 0
	RESPR (n)	Location of reserved procedure (or machine) space
	DATE	Actual value of clock

lines of Basic. It does GOTOs and GOSUBs but. curiously. not RESTOREs. It will do its best with computed GOTOs, by altering any number at the start of the expression. When any errors occur — which they freqently do - to restart them you can usually CONTINUE (note the lack of possible abbreviation to CONT). If the error was caused arithmetically, such as by division by zero, you can change any offending variables value, then attempt a RETRY. Note that changing a line will cause all variables to be CLEARed.

### **Graphic Descriptions**

Unlike such dinosaurs as the Commodore 64 (the one with the 'elephantine' memory of 64K!) the QL supports a wealth of graphics commands, using both of the hi-res graphic modes. As the two modes produce different shaped pixels and thus different x-y ratios - most graphic commands work on the pixel co-ordinate system. This fixes the screen at 512x256 pixels, regardless of the mode, so that things come out similarly in either. The graphics origin (0,0) is at the top left of the screen and to confuse the matter, text is normally printed in rows and columns that are multiples of pixels, as on the Spectrum for example.

Before going into further detail, some general explanation is needed about graphics on the QL. You can select from either four-or eight-

colour, depending on the mode, and different shades are available by using stipples. These are patterns that, on a monitor or a decent TV, make a good approximation to different colours. As well as all this, the QL screen is usually divided up into a number of windows, each a near-independent section with its own cursor, colours and position. Each window is accessed by a stream number, used by adding #xx immediately after the command, and preceeding any other parameters. Assuming a stream is open (see later), then the WINDOW command reassigns its attributes. It's followed by #stream number, the x and y positions relative to the top left of the screen, then the width and height in pixels of the window.

Most of the following commands permit the addition of stream numbers, and most of the graphics commands share another common feature — they are all mind-blowingly fast!

Firstly the graphics commands, and here the most important is MODE as it determines screen resolution and the number of colours available. Although various numbers are accepted, I feel it's clearest to use MODE 8 for 256x256, eight-colour mode; and MODE 4 for the high-res mode, with 512x256 in four colours. The PAPER and INK commands are used to select the colours required a la Spectrum. Normally the range is

0-7, though parameters up to 255 may be used, resulting in various ink/ paper/stipple combinations. There is also the FLASH command, for use in MODE 4 only...MODE 8 does not support flashing.

To plot pixels, you use the POINT or POINT\_R commands. Follow this with the x and y co-ordinates, repeated any number of times. The difference between them is that POINT\_R is a relative command that plots a pixel relative to the last one plotted. There are several other commands that use \_\_R to specify their relative cousins. To draw lines, LINE and LINE\_R are used. They must be followed by two sets of coordinates. separated by the ubiquitous TO. Multiple lines may be drawn by, for example, LINE 10,20 TO 100,20 TO 100,100. If you don't specify the initial point, it will assume the last pixel plotted. For drawing the ARC and ARC\_R curves commands are used in a similar way to the previous couplet, but with a third parameter that specifies the angle turned through (in radians). The CIRCLE and CIRCLE\_R commands draw circles and ellipses, and require three, four or five parameters. For circles, specify the x and y coordinates of the centre, followed by the radius. For ellipses, you can optionally specify the eccentricity (from 0-1), and the angle. There are also the commands ELLIPSE and ELLIPSE\_R, which are identical to the previous two.

A very powerful command is FILL, which may be followed by either 1 or 0. If it is 1, then every time a closed shape is drawn it will be FILLed with the current attributes, very quickly. The algorithm is not 100 per cent intelligent, and won't fill complex shapes in one go; however it uses no workspace and performs PDQ. FILL 0 simply disables this feature. The RECOL command is a crude emulation of colour palettes that enables you to almost instantly redefine all the colours on the screen. Eight numbers should follow it, specifying a new colour for each of the existing colours.

The scroll command scrolls the screen a number of pixels and a positive parameter scrolls it up the set number of pixels - a negative number produces a downward scroll. An optional parameter can specify parts of the screen ... namely 1 for the top of the screen down to the cursor, and 2 defining the bottom of the screen, up to the cursor. As this is normally used with windows, it allows easy and smooth scrolling of any section of the screen in any direction. A compatriate of this is the PAN command, which does the vertical equivalent, in either direction. For BLOCK filling rectangles, the command creates filled rectangles specified by the x and y position of the bottom left, and the width and height.





### KEYNOTES OF SUPERBASIC

In theory SuperBasic also includes certain turtle graphics commands, for Logo style programming. These are based on an imaginary turtle in the screen, armed with a pen. Instead of using the x-y method of describing positions, it's controlled by rotating and moving forward only. The command PENDOWN makes him draw lines wherever he goes, while PENUP stops him drawing. TURNTO followed by a rotation in degrees turns the turtle to a particular direction, while TURN rotates him relative to his last position. Finally MOVE followed by a number actually forces him into action. All this sounds very positive. However, when we checked the turtle graphics commands, nothing seemed to happen - although the commands were accepted. Presumably the ROM routines have yet to be included.

For text operations, windows can again be used. The colour of the output depends on the current PEN and INK, as well as UNDER (for underlining) and OVER (for overprinting). CSIZE is used to select the size of characters printed and it's parameters. followed by two specifying the width and height. Width values of 0,1.2 and 3 specify. respectively, pixel widths of 6,8,12 or 16 pixels, while heights of 0 and 1 give 10 or 20 pixels. Depending on MODE, these give 85, 64, 42, 32, 21, or 16 characters per line, with 25 or 12 lines per screen. The AT command can be used to position the text cursor which locates it in character positions; for more accurate text positioning, the CURSOR command can be used. The BORDER command adds a border of specified width around the edge of the selected window - an area in which neither printing nor plotting can take place. An (optional) final parameter is the colour of the border, while PRINT and LIST statements followed by #xx also direct output on to chosen windows.

### In And Out

Input/Output is the method by which the QL reads and writes data to its peripherals. On a standard QL there are several forms of I/O, namely the Microdrives, the RS232 ports, the keyboard and screen, and the network. In theory at least, they should be 100 per cent interchangeable, so you could direct, for example, printer output on to a Microdrive. The QL also has the provision for additional I/O devices, plugged into its expansion port. Each device is accessed by a name followed by an underline, optionally followed by further data. As well as general I/O commands, there are

some specialised commands for certain devices. The specific commands are NET, to set the network number, and BAUD to set the RS232 baud rate.

The general I/O commands really begin with OPEN. This should be followed by #stream, and then the device specifier. There are also special forms of the command, namely OPEN\_IN and OPEN\_NEW. for specific direction I/O. Once a stream is open, data can be sent to it using PRINT #n, and read from it using INPUT #n, and INKEY\$(#n). For input from a device the EOF(#n) function returns 1 when the file's contents are exhausted. When all I/O to a particular device are finished, the stream can then be CLOSEd, to free the stream and associated memory. Annoyingly, if you CLOSE a stream that's already closed, an error is produced. This is better than the Spectrum reaction (a system crash), but not as good as the Interface 1 response, which simply doesn't mind.

Certain I/O does not require streams - just device names - and these include things like DIR, for directory, DELETE, for removing files, and SAVE, LOAD, SBYTES, LBYTES for saving and loading programs and bytes. There's also MERGE, LRUN (to load then run), and MRUN. The last interprets a near normal ASCII file, then loads it as a program. It's not quite true ASCII, as the QL peculiarly requires carriage return to be CHR\$(10), when everything else knows it as CHR\$(13). For saving and loading multi-tasking software you've got the SEXEC, EXEC and EXEC\_W commands - though until some technical info becomes more available, it's hard to pass any comment.

### **And The Rest**

As with all Basics, there are some odds'n'ends in SuperBasic, that don't fit into any of the above categories. Firstly, there are two commands to access the real-time clock, namely ADATE and SDATE. SDATE needs to be followed by six numeric parameters — namely the year, month, day, hours, minutes and seconds; ADATE allows the seconds to be separately adjusted.

There's also BEEP, for controlling the internal speaker, and this needs 2,5,6,7, or 8 parameters. These specify duration, pitch, second pitch, x-rate, y-rate, wrap number fuzziness, and randomness. Apart from producing simple tunes, it's very difficult to accurately predict what a given set of parameters are likely to do — definitely a case for trial and error.

And there's a PAUSE command, similar to that on the Spectrum. If you follow it with a number, it'll wait for that many 50ths of a second, or until a key is pressed; if no number is given, it'll wait indefinitely.



Tim Fourfold insists Sinclair Research has gone out on a limb with SuperBasic, a language he believes harks back to the largesse of the sixties.

Sinclair MD Nigel Searle says that SuperBasic is "so different from Basic that it deserves a new name". That new name might just as well be Basic-C, because SuperBasic forms a bridge between good old Basic and C, a fashionable language for larger computers. The interesting thing is that SuperBasic makes hardly a concession to the language which academics swear by — despite its 'procedures' and 'functions'. SuperBasic is a poke in the eye for enthusiasts of Pascal and adherents of 'watered-down' Pascal derivatives like Comal and BBC Basic.

At first sight SuperBasic and Pascal have a lot in common. They both allow programs to be written and tested in small chunks with their own, temporary variables. However this doesn't clinch the comparison. Languages like C, Algol, BCPL and even the weird APL provide those facilities. The differences between Pascal and SuperBasic are much more numerous, and more crucial too, since Pascal is the language of academics and Sinclair has declared its intention to make the QL a best-selling schools machine.

### **The Philosophy Of Errors**

Modern programming philosophy revolves around the idea of detecting errors before they ever become part of a 'finished' program. There are a number of respects in which QL Basic goes against this trend. Languages like Pascal and Modula 2 feature 'strong typing'. This means that the programmer must specify the exact 'type' of each item of data - the range of values allowed, whether they are text or numeric, whether decimal values are permitted, and so on. In normal Basic there are just two types of variable: numeric and string. SuperBasic adds 'integer' (whole number) variables to the list, but this can add confusion rather than versatility.

Pascal lets you define 'types' of your own: a type 'percentage' might be used to hold whole-numbers between 0 and 100, for example. Data types can be made up of more than one item — you could define a type called 'squaddie', containing three items: a name, a rank, and a number. The name would in turn be defined as an array of a certain number of characters; similar definitions would exist for rank (either another array or an 'enumerated type' — a collection of exclusive possibilities) and number.

The merit of this approach is that it allows the Pascal compiler to spot mistakes or operations which might bring about strange results. It could detect attempts to give someone a fractional percentage, or a mark less than zero. It's helpful if the language points out these inconsistencies when the program is entered, rather than when it's run.

The designer of Pascal, Niklaus Wirth, wrote a book called *Algorithms* + *Data Structures* = *Programs*. QL procedures and functions may make it easy to write algorithms on the machine, but the facilities to handle datastructures are still lacking; the only innovations of the QL, compared with the Spectrum, are integer variables and a facility to 'slice' (select parts from) numeric arrays as well as strings.

### **QL Won't Be Typecast**

The QL positively encourages programmers to muddle different types of data together. You can happily enter nonsense like:

### LET A%=3.4+"2"

and the QL will convert the string "2" into the decimal number 2.0, add 3.4, and then throw away the decimal part so that the result will fit into A% — an integer variable. The percent sign indicates that A% can only hold whole numbers.

This automatic conversion, known as 'coercion', actually makes it more difficult for the QL to detect errors when you enter them: the ZX81 would have no trouble finding the error in a line like:

### 10 LET A\$=CHR\$ B\$

The CHR\$ function is used to converta number into the character with the corresponding code. As far as the ZX81 is concerned, B\$ is a string not a number, and the line is wrong. The QL automatically converts strings into numeric values (if possible) so it can't tell whether or not the line is correct until the program is RUN and the value of B\$ is known.

Even more confusing is the performance of QL procedures and functions. These allow you to design programs in sections; each section has its own, temporary variables. It can also be given copies of variables 'outside' the section. When you define a function or procedure you don't specify the type of data which will be processed. In theory this means that you could define a function to display a group of numbers, and then use exactly the same definition to display text instead. This could be a powerful feature of SuperBasic, but once again it can cause confusion and make it hard to spot logical mistakes.

It is encouraging that SuperBasic makes a distinction between adding strings (PRINT "QL" & "USER") and adding numbers (PRINT ZX+81). On the QL you use the ampersand (&) to show concatenation (sticking strings together) and the plus sign (+) to indicate numeric addition. This distinction was probably forced upon the designers by the large number of type conversions possible — without the '&' option the QL would not know whether the result of:

### PRINT "2" + "2"

was "22" or 4! In fact the QL would treat that '+' as an addition sign, giving the result 4. To obtain "22" you'd have to enter:

### PRINT "2" & "2"

SuperBasic uses the equals sign '=' for comparisons and assignments, leading to odd effects which look familiar to standard Basic programmers:

IF J=K+1 THEN LET J=J+1

Here the equals sign serves two different purposes depending upon whether it is preceeded by IF or LET. The equivalent Pascal line would use the ':=' operator, called 'becomes', to indicate the ausignment:

IF J=K+1 THEN J:=J+1

This makes more sense, because we normally use the equals sign to indi-

cate equivalence rather than assignment. J=J+1 is algebraic gibberish how can J equal J+1? Once again this laxity of SuperBasic can delay the detection of errors. SuperBasic does support an interesting 'almost equal' operator, typed as two equals signs one after another.

### **Fiddly Bits**

Another philosophical difference between SuperBasic and other high-level languages(apartfromC) is the way that SuperBasic allows you to fiddle with the bits — binary digits — of a value. The operators of the C language are used: pairs of ampersands for bitwise AND, two vertical bars for bitwise OR, and even a pair of caret marks to denote the exclusive-OR operation. Other languages make these manipulations difficult or impossible, on the basis that they should be avoided since they make programs machine-dependent; if software relies on the number of bits in a word, it may not run on computers with different sized words.

### The Giveaway

It's hardly surprising that Sinclair plans to issue a 'C' compiler for the QL at an early stage — SuperBasic, like almost all of the QL ROM, was programmed in C! SuperBasic provides an introduction to some of the features of C. In the meantime, the acceptance of the QL in schools may depend on academic enthusiasm for languages less rigorous than Pascal.

Ever since the launch of SuperBasic, people have been saying that it's a lot like Pascal. Below is the same listing in both languages. . . see what you think.

SUPERBASIC		
COMMENT	LISTING	
Define function fact (a) heading	DEFine FuNction fact (a)	
Main loop of function — this is the part which looks similar in Pascal	IF a=0 THEN RETurn 1 ELSE RETurn a*fact (a-1) END IF END DEFine	

This in fact is an example of recursion, where the function 'fact' calculates the factorial of a number. Note the use of QL keywords IF . . . THEN . . . ELSE.

PASCAL		
COMMENT	LISTING	
Program heading	Program factorial (input, output);	
NB variable is declared	var a: integer;	
Start of function definition	function fact (number:integer) :integer;	
Body of function like SuperBasic	begin if number=0 then fact:=1 else fact:=number* fact (number-1) end;	
Demonstration loop	begin repeat write ('Enter a number:'); readin (a); writeln ('The factorial of ',a,' is ',fact(a)) until a=0 end.	

In this, the Pascal version, there are similarities, but certainly it's not as easy to understand.

## SECRETS OF THE 68008

There's a lot more one can do with the 68008 CPU processor chip than endlessly jaw over whether it can or cannot be described as a 32-bitter. To begin with, many a QL owner will have recently made the transition from the Z80-based Spectrum, and the difference in philosophy behind the two chips is important in that it's likely to mirror something of the difference in thinking behind the machines themselves — especially as programming in machine code is certain to be a prime area of future activity. In 'A Process of Philosophy', we see that the Motorola 68008 is able to 'trounce' the Zilog Z80 in a number of key ways — for instance in its ability to perform 32-bit mathematical calculations in one-fast step, and also by virtue of its built-in 'pipelining' characteristic that allows for far more efficient use of processor time; thus waiting is kept to a minimum.

Then, in 'Cracking the Code' we move on to view the 68008 more from the practical position of programming in machine code. For all those buffs who're only happy when they're battling against bytes, *QL User* sets out to analyse the Pandora's box that awaits them. The QL CPU processor chip is not exactly one that's tamous throughout the home and personal computing world. Therefore we anticipate the information vacuum by outlining the full 68008 instruction set and analysing, too, many of its intrinsic properties.

## **A QUESTION OF PHILOSOPHY**

It seems likely that many a Sinclophile will be graduating up from the Z80 processor of the Spectrum, to the 68008 of the QL. Simon Goodwin contends that the difference between these two is not just a matter of a few extra bits here or there, but more a question of basic philosophy.

Ever since Sir Clive announced the launch of the QL there's been great fuss over the choice of processor for the new machine. Sinclair Research advertisements describe the 68008 as a '32-bit processor', while journalists rush to their fact-sheets and deduce that, with it's eight-bit data bus, the processor is in fact little more than an inflated Z80.

### **FIRST THINGS FIRST**

The first microprocessors were designed in a rather *ad hoc* manner, rather like the first computer programs. A few people thought for a while and came up with the bare bones of design — the internal timing of instructions, the interface between processor and memory, and some idea of the 'logical operations' possible — rotating values, adding, setting bits, and so on. Parts of the design were built, up and tested in hand-made units, each comprising of a few hundred 'building-block' chips.

Once the bare bones were established, the race was on to flesh them out as much as possible. In essence, the designers considered each part and tried to work out all of the useful things that could be done with it. In the process they added a few registers, took away an operation, and so on until the chip — the slice of silicon used as a base for the processor — was chock-ablock with transistors. Then they tested everything and produced a book listing the 'instruction set' of the device; if anything didn't work, they just didn't mention it at all!

This approach to processor design was appropriate to the first micros; they were squashed on to quite a small area of silicon, with no room for an elaborate design. The resultant chips were hard work but great fun to program. Just because an instruction worked in one circumstance didn't mean it would even exist in the next!

The Intel 8080 was the first really useful microprocessor; then a group of people left Intel, cut a bigger piece of silicon and came up with the Zilog Z80. Not surprisingly, this device turned out very similar to the 8080 — in fact, it would run 8080 programs quite happily. Zilog used its extra silicon to stitch on lots of extra instructions.

The 8080 had eight-bit increment instructions. The company added 16-bit equivalents, but there wasn't room to make them work, ie. exactly the same way so that the new instructions didn't 'flag' the result of the operation (zero, overflow or whatever).

Zilog added about 450 'official' instructions to the repertoire of the Z80, but in the process it created another hundred or so 'unofficial' ones which were never mentioned! A determined hacker can uncover all sorts of oddities, like an 'eight-bit double and increment' — the missing SLL (shift left logical) instructions: CBH 30H to CBH 37H. These form a conspicuous gap on page 184 of the Spectrum manual!

The first processors were designed with hardware problems in mind there was no point coming up with a super-whizzo useful set of instructions if they couldn't be built into a chip! In the last ten years these hardware problems have eased, while software problems have multiplied.

### PROGRAMMING PHILOSOPHY

The Z80 was designed specifically for ease of wiring up. The 68000, on the other hand, was approached from the



CHIP CHAT

### SECRETS OF THE 68008

point of view of programming simplicity; part of this ease stems from the fact that you don't have to throw away your programs when you move from one modern processor to a cheaper or faster one.

Motorola designed a range of processors, rather than a one-off. The original 68000 has spawned a number of versions with differing hardware requirements (including the so-called 'eight-bit' 68008 and the '32-bit' 68032) — but they can all run exactly the same software. This is what Sinclair Research is trying to say when it calls the QL 'future-proof'.

On a Z80, every register has its idiosyncracies; only the C register can be used to address ports, only the Bregistercanbeused infast loops, only IX and IY can have an index, and so on. With the 68000 series, however, sets of registers work identically; each can be, for example, an index register, a stack pointer or a counter - the same instructions are available regardless of the register chosen. The data registers of the 68000 family are all 32 bits long, regardless of the way that data is passed back and forth between processor and memory (although this varies between members of the 'family').

This consistency makes it easy to

THE Z80 CPU

learn the 68000 instruction set; you don't have to cope with all the quirks of the Z80. The symmetry also makes it easy to fix bugs, alter programs and write compilers —it's much more difficult to write a good Z80 compiler because of the vast range of special cases which must be allowed for before there's any chance of producing the best code.

A good compiler for the 68000 can produce code — from a high-level language such as 'C' — which is very nearly as efficient as hand-written code. That's how QDOS and the most popular 68000 operating system, UNIX, can be written almost entirely with a compiler rather than an assembler. Compiled programs are much easierto write and test than assembled ones.

### **COMPLEX INSTRUCTIONS**

In theory, a 16-bit micro is twice as powerful as an eight-bit machine — it can process twice as much information in a single step. In practice, though, the difference is usually much greater, because intermediate steps are usually needed to convert two eight-bit answers into a 16-bit result. The 68008 produces the 16-bit result immediately.

The 68008 incorporates complex instructions which do in one step what for a simpler processor would take many. For instance, the 68008 can perform 32-bit multiplication and division in a single and fast step. The equivalent process would take well over a hundred steps on a Z80. The 68008 doesn't sacrifice flexibility by using its 32-bit registers — each instruction can be used in a 32-, 16- or the more concise eight-bit form.

### **PIPELINE PERFORMANCE**

Another big difference between the 68000 family and the Z80 lies in the way the 68000 reads values from memory. The 68000, like the humble 6502, uses a technique called 'pipelining'. A processor works by fetching instructions, decoding them and then performing the appropriate actions. Whereas the Z80 performs these three actions one-by-one, the 68000 uses a completely separate unit to read instructions so that it can get on with reading the next few instructions while the rest of the processor is working out what the last one meant.

The 68008 has often been criticised because it reads and writes data in small eight-bit sections; a 'true' 16-bit processor would use larger lumps. But the difference in performance between 68000 and 68008 is much less marked than you might expect because the pipeline allows the processor to get on with fetching the data piecemeal while the instruction is being decoded. So, by the time the data is needed, it's usually in the pipeline and the 68008 doesn't have to wait for it to be fetched, eight-bits at a time.

A process Of Philosophy was first published in the pages of Your Spectrum, Britain's No.1 magazine for owners of the Sinclair/ZX Spectrum. (Don't miss it!)



The 280 is an extended version of the 8080 which includes a more versatile instruction set and a 'spare' set of its major registers. All the registers are 16 bits long except for the Accumulator which is 8 bits long. (The other 8 bits are used for the Status register.)

Ix and Iy are used as index register.) to tables. The Stack Pointer and Program registers hold the addresses used by the ALU as its program and data stores. The Z80 is unique as it also has an Interrupt register of 8 bits (I) and a Refresh register (R). The Interrupt register holds the top 8 bits of an Interrupt address and the lower 8 bits as supplied by the device. The Refresh register counts the number of times a selected ROM is refreshed and eliminates vet another external chip.

## **CRACKING CODE ON THE QL**

Tucked away inside the new machine is the 68008 processor CPU chip, a relative stranger to our personal microcomputing shores. Stephen Adams delves into its architecture and suggests the coming trials and tribulations of machine coding on the Sinclair QL.

It's no secret that the QL has a different processor to other home computers - most of which are based either on the 6502 or the Z80. In fact the 68008 in the QL harks back to a predecessor of the 6502 chip, the 6800, and has a similar vocabulary of instructions. The 68008 is an 8-bit version of the 32-bit 68000 processor and is completely software compatible, even though it uses an 8-bit data bus. The memory addressed is also shorter; 1 Megabyte as against the 16 Megabytes of the 68000. As the data byte for each memory location is only 8 bits wide, each 32-bit 'Long Word' requires four bytes of memory; therefore it takes four times as long to squeeze out.

As the 68008 works on interrupts, timing is impossible using the CPU's internal clock; that's why a separate processor (the 8049) is used for input and output (including the keyboard). The chip might also have to be programmed so as to allow the users to gain access to disks and so on.

The CPU has inside it eight data registers (numbered D0 to D7) and eight address registers (A0 to A7) that contain data (see 68008 - Internal Architecture on page 47). It also has a program counter and Status register. Apart from the Status register (which is 16 bits), these are all 32 bits long. Address register A7 is used as the stack pointer and in fact consists of two registers, the User Stack Pointer (USP) and the Supervisory Stack Pointer (SSP). Depending on the state of Supervisor flag in the Status registor, one or other will be present in A7.

When using machine code, you'll always be in the User state, with the status bit 13 set. Any programming error, interrupt (internal or external), TRAP, TRACE or operation directly on the Status register will cause the 68008 to jump to an address contained in the bottom 1K of ROM memory; the precise location depends on what caused the jump. However, as these instructions are banned in the user state, it'll jump to an error routine in ROM. These vectors are stored in ROM and cannot be altered. They are known as Privileged instructions and can only be used in the Supervisor state.

It would seem from this that the user is not allowed to take full control of the processor, something that hasn't happened before on other Sinclair machines. The Status register is

divided into two parts... the system byte which controls the state of the processor (bits 8-15) and the user byte (bits 0-7) which is the same as the flag register on the Z80 except that it has an extra carry flag called EXTEND. This X flag is used to indicate carry, on 32-bit operations. The system byte contains flags for the TRACE mode (for single stepping through program instructions, bit 15), Supervisor state (as mentioned above) and the interrupt mask (bits 8-10).

Machine code instructions can operate on data arriving in any of four forms, 8-bit Byte, 16-bit 'Words', 32bit 'Long Words' and Binary Coded Decimal 8-bit bytes. These are identified by the letters B (Byte), W (Word) and L (Long Word) in the assembler instructions. Address registers are used as references to data or program areas, but can only be used with W words and L words. A7 and the stack pointer must be used with L words.

Instructions can be used to protect the upper parts of the registers, while operations are done on the bottom end. The instructions used with QL run into at least a thousand different variations (compared with the Z80's 174), but all are at least one Word long. The first 16-bit Word contains the information the processor needs concerning the type of operation and whether any more Words are required. All the Words after this first Word are EXTENSIONS (that is, data) which are either to be used as the source or destination of the data. They can also be used as an index to a table, from where the next data will be taken. So instead of programming in bytes, you'll be programming in 32-bit Words. The program counter reflects this in that it increments four bytes at a time.

The instructions (as listed in the 68008 Instruction Set) have different names to those of the Z80; therefore equivalents (where available) are also listed. The addressing types are: **Register Direct** Transfer using register numbers only in the instruction.

**Register Indirect** Using the address contained in the registers



CHIP CHAT

**SECRETS OF THE** 68008

themselves for access to data. Absolute Using data contained in the instruction as an address. Program Counter Relative As in the jump relative instuctions on the Z80, but using a 16-bit offset. Immediate Using data stored in the Instruction rather than the Data area.

Implied Using stack pointers, program counters as references to

	68008 INSTRUCTION SE	
WORD	OPERATION	<b>Z80 EQUIVALENT</b>
ADBC	ADD decimal with X	
ADD	ADD	ADD
AND	Logical AND	AND
ASL	Shift left	SRL
ASR	Shift right	SRR
Bcondion	Jump relational on condition	JRcond.
BCHG	Bit test/change	
BCLR	Bit test/clear	
BRA	Branch	JR
BSET	Bit test/set	
BSR	Branch subroutine	
BTST	Bit test	BIT
CHK	Register compare limit	*
CLR	Clear data after	*
CMP	Compare	CP
DB	Test, decrement and branch	
MULS MULU	Multiply Signed or Unsigned 16 bits	
DIVS DIVU	Divide Signed or Unsigned	
EOR	Exclusive OR	XOR
EXG	Exchange registers	
EXT	Sign X	Carry Set
IMP	Jump	JP
JSB		CALL
LEA: PEA	Load Push register on stack	PUSH POP
LINK/BLINK	Use register as Stack Pointer and restore	
ISBISI	Logical shift left/right	SI A SRI
MOVE	Load memory or register	
NEGCD	Negate decrement with X	
NEG	Negate decidinent with X	NEG
NOT	Ones complement	incu incu
NOP	Do nothing	NOP
NDI NDI		
DESET	Reset external devices	*
	Pototo loft/right	
	As above with X	
	As above with A	
	Return and restore	
	Return and restore	DET
nið enen	Retuill Cubtrast desimal with Y	nci
Socialities	Subtract decimal with X	
S CUMUITION		
210P	Stop program	
20B	SUDTRACT	20R
SWAP	Swop data halves	
TAS	Set condition on data	
TKAP	Jumps to Trap routine	
TRAPV_	Jumps to routine on overflow	
TST	Set condition using registers	

Banned operation in user mode.

Branch is always a relational jump. Condition indicates use of Status register flags.

data.

And you can add to this, Repeated Instruction (incrementing or decrementing the address used), and using the registers as a pointer to a table of data.

With all this wide variation of instructions on 16 different registers, an assembler is well recommended. Unfortunately none is available at the moment and although machine code data can be entered on the QL, it cannot be run on Version 1 of the software.

As an example of the power of the instruction set, the DIVIDE and MULTIPLICATION instructions are included in the CPU. Instructions such as divide and multiply will only work on words and the data must be contained in one register. This is purely an integer function as no processor understands floating point arithmetic. The result given is therefore a sum of 16 bits with an overflow (if there is one) and a remainder if the operation is a divide.

The QL has no USR call, but uses the instruction CALL followed by a set of optional parameters. These set up the data registers D0 and D7 and registers A0 to A7. The register D0 must contain 0 on returning to the Basic or an error code using D0 as the error number. A6 must not be altered as it holds an address used by QDOS. A7 of course will be set up as the User Stack Pointer.

An area of memory can be reserved by using the instruction RESPR (X) which reserves X bytes of memory. This is done by lowering the top of the available memory to give the number of bytes required; running the program again will lower the top of memory by X bytes until it crashes the machine. CALL is intended to allow the user to create new commands using machine code and thus does not return a value to Basic. Any values must be dumped into the reserved area of memory and read back by PEEKing the location after returning to Basic, via the **RTS** instruction.

When implemented, a program using machine code would go something like this (the syntax on the final version may be different, but the program lines will be similar):

**1000 REM RESERVE AREA** 1010 LET A= RESPR (100) 1020 PRINT "RESERVED 100 BYTES FROM ";A 1030 FOR X= 1 TO 100 1040 READ D: POKE A+X,D **1050 NEXT X** 1060 CALL A, DO, D1, D2, D3, D4, D5, D6, D7, A0, A1, A2,A3,A4,A5 1070 REM RETURNS HERE IF DO = 0 1080 DATA 1,2, ETC

But until Sinclair furnishes us with the full Basic manual and a properly working Basic in the QL, the only way a user canlearnabout how the QL functions is by using PEEK to look at the memory.

### **Supplying The Mythical With The Hypothetical**

In the race to produce hardware add-ons for the until recently unseen and unfinished QL, manufacturers are falling over themselves in their attempts to gain the distinct advantage of at least announcing their intention of designing the add-ons users will need to turn the QL into a dream system. And even though the difficulties involved may turn the dream system into more of a 'dream' than you at first thought, when ever did lack of information or specifications get in the way of the forces of big business?

Within a couple of weeks of the QL being announced to a suspecting public, linked advertising was spotted in the pages of Personal Computer World magazine. There was, for instance, Miracle Systems of Cambridge which said it was planning to supply the QL owner with a parallel printer interface, "But", we asked the company's Mr Honeyball, "how can you produce such a device without the necessary technical details?" "Well, actually", he said, "it's not in production yet. But it'll only take us three or four days to tailor the interface after the first batch of QLs becomes available." Anyway, for £49 the purchaser gets an

interface that plugs into the serial port; no software is required to drive it. Since that discussion, nothing more has been heard at our end. If you're interested, phone 0223 312886 and see how they're doing.

Lurking but a few advertising pages away from Miracle Systems we found Xcom (Services) Ltd of London; the company had been quick to notice that the QL was incompatible with floppy disk drives - and was doing something about it. But how had Xcom managed to design a QLcompatible disk drive unit, complete with controller, that plugs into the expansion port? Well, it hadn't-but you could make do with an RS232 interface. says the company's Mr John Seaman.

As far as Xcom is concerned, the QL is very much a computer to be associated with and, despite an apparent lack of the machine itself, the ads continue to be placed with the QL-based disk drive still very much the star attraction. More details on 01-539 4147.

Following up stories like this can be very

despressing, especially when the company you phone seems more interested in the possibility that you've actually managed to get hold of a QL, rather than going into too much detail about its own would-be products. But one company (which shall remain nameless) had a rather different story to tell; it had the obvious pleasure. of being 'in' with Sinclair Research, and thus had a chance to sample the wares before the general public or Press.

Unfortunately, the various versions of the preproduction QL had proved more confusing than helpful, and, to date, company 'X' is still awaiting the suitably finished article it needs in order to carry out proper experimentation. This, in fact, is one company that probably more accurately reflects the market for addons; Sinclair Research computers have always been blessed (thankfully!) with a more than adequate hardware support industry and most seem to be waiting for the definitive QL before taking the advertising plunge.

A company with rather more chance than many of achieving compatibility is Microvitek, the Bradford

based firm that produces high quality monitors. Coming complete with a 14inch screen that's capable of a 653 by 585 pixel display, the company claims that its modified Cub monitor is ideal for the QL Further facts on this one can be chased up on 0274 390011.

### **Great Fables** Dept

From the hypothetical to the well nigh impossible, and here comes perhaps the best story of them all. Joe The Lion, a new-ish software house, has been putting it about that it's currently working on a project that will allow QL owners to reap the benefits of running Spectrum software on the QL.

Called the Spectrum Emulator, this Microdrivebased program will (it is claimed) allow the wealth of Spectrum software to jump straight into the QL RAM just like that. Sounds great, doesn't it? The only trouble is that Joe The Lion is currently scouring around for Z80 and 68000 programmers to write the thing-which isn't exactly the most inspiring of news. (By the way, fairly recent word for Commodore 64





publication for reasons as much altruistic as financial. When it comes out I'll look forward to reading and using it.

Meanwhile, *The Sinclair QL Companion* (by Boris Allan) is published by Pitman Publishing Ltd, price £6.95 and ISBN 0 273 021877.

Nigel Cross

### **GST Goes OEM**

An interesting development in the QL world has been the announcement from GST Computer Systems Limited of Cambridge of an OEM product based on the QL.

For those not in the know, GST is the company that was responsible for the QL's QDOS operating system. Using its obvious understanding of the Motorola 68000 range of processors and the Sinclairdesigned board, it's now negotiating with Sinclair Research to produce an OEM product around it. Provided with the system will be GST's own operating system, 68K/OS, and the idea is that systems houses and OEMs will be able to use the product to provide added value systems in a variety of application areas.

It's interesting too that the system will allow the capability of a 16K ROM slot for bespoke software which is not unlike the ROM cartridge concept that the QL has now. Being able to use this slot for the software will free the rest of the memory for data, etc., for such things as CAD, data acquisition and point-of-sale requirements.

Already available for the system is a software development environment allowing programs to be written in Pascal and assembler using either Motorola EXORmacs or the VME/10 to run under 68K/ OS. In brief, this operating system needs only 32K ROM and 64K RAM to provide a useable system with functions such as multitasking, multiple windowing on screen and device independent I/O. An optimised disk filing system is an inherent feature of

owners was that a program was being written to allow Spectrum software to be run on the '64; now, nearly three months later, an update on the situation is still awaited from Phoenix Software.)

Another slight problem (apart from the fact that most of the experienced programmers we've mentioned the idea to, reckon it can't be done) is the cassette interface. The QL hasn't got one-which provides yet another mammoth task for the gallent crew of HMS Joe The Lion. Presumably, the software house named itself after the eponymous track on the David Bowie Heroes album; maybe instead it should have flipped over to the other side for Sense of Doubt.

### QL Brought To Book

It's the year of the Olympics (in case you hadn't noticed), an event where many of the world's top athletes and performers battle it out to be first past the tape. Book publishing can be a lot like that too. Whenever a major new computer or package is announced, there's a tendency for publishers and writers to pull out all the stops in a supreme effort to get their mighty tome to the bookshops in the shortest possible time — and thus gain a distinct commercial advantage over the competitors. Pitman Publishing Ltd and author Boris Allan have definitely hit the line first with The Sinclair QL Companion.

Not only is this the first of many QL orientated books to reach the public, it's also managed to sell out in record time. Unfortunately, there's often a price to pay for such 'fleet of foot' publishing action — quality can become directly proportional to the time taken to write it; and in this case, quite a few people believe that Boris has blown it!

This would be a shame, because Boris in the past has produced some eminently readable and useful books (his one on Logo being perhaps the best). In trying to get this particular title to the shops first, it's a fair guess that he relied heavily on preliminary documentation (now considerably changed) and the experience gained directly from other projects. For instance, a chapter on turtle graphics seems to have been lifted straight from a previous book (the Logo one) and although the program examples have been changed to reflect the

capabilities of SuperBasic, the whole thing is now redundant. Why? Because SuperBasic now contains all the keywords and functions necessary for performing turtle graphics; the subtle programming techniques that he illustrates in the book are now irrelevant.

And there's a section on the Intel 8049 processor (for keyboard and other associated processes) which is useful, but only five



### Boris' book — first past the post, but all the worse for it.

pages in length. That's hardly a good enough reason for spending £6.95. I always feel diffident being rude about somebody else's work, but no doubt Boris and Pitman will produce something in the near future that's worthy of

IOE WRIGHT

68K/OS, so it's possible that we could see QL lookalikes with disk available in the near future, thereby removing the grouse that many have about the QL's Microdrives.

GST is already in negotiation with a number of software suppliers to provide languages and applications for its new operating system; Pascal, C, Basic, wordprocessing, database and spreadsheet are among the first packages expected to arrive.

Anyone interested in the system should contact Dr JS Fenton at GST, on 0954 81991.

### The Printed Herd

Pitman isn't the only book publisher hard at it trying to blast the market with QLbased books. Three other outfits at least are closing in with their offerings — Century, Hutchinson and Melbourne House.

Looking at Century first, the company is expected to release no fewer than eleven books in total, seven of which will be directly QLrelated and four less so. Of particular interest are five books about the software that comes bundled-up with the machine - Quill, Easel, Archive and Abacus - one title for each, plus another giving an overview of their inter-relationship and explaining how to use them. Going under the group title



of QL Software User Handbooks, these should be very useful for the prospective business user.

Also from Century are two technical works: Quantum Theory and Advanced Quantum Theory, and four others relating to both use and programming of the Motorola 68000 and 68008 chips, as well as the language C. Century Managing Director, Richard Brockbank, wouldn't be drawn into giving a release date for the titles, but did say that they would only arrive in the shops as and when adequate quantities of the machine have been produced and distributed.

Little, unfortunately, is known about Hutchinson's offering, save for the fact that a series of titles will be available under the editorship of Robin Bradbeer (of Spectrum manual fame!). It's expected the series will run initially to around ten titles; again release dates were not available.

With both Century and Hutchinson liaising with Psion (the bundled software originators) for the writing of their books, the results promise to be accurate, readable and useful.

### The Great Accumulator

If you were one of the many who sent cash off to Sinclair Research in the hope of getting a '28-day delivery' QL, you'll no doubt have been disappointed to see the resulting chaos which has ensued since January. For the most part, Sinclair Research spokespeople parried the delay with a resounding "no comment" and stories in the press – computing and otherwise – were generally confused.

Now, after some five months, Sinclair Research seems strangely proud that (at the time of writing; 1000 QLs have been sent packing to their owners. And yet at the high point of ordering, it was rumoured that £200,000 a day was drifting into the Camberley offices. ha to Sinciair only alt. What been sent up you your QL has been despatched. The demand for the QL has been phenomenal from the day we launched it. We expect to be able to deliver your QL not later than the end of June. We realise that the time later than the end of June. We realise that the time that your QL will be worth waiting for and, of course, we will do everything possible to beat our target date for sending it. Yours sincerely Migel Searle Managing Director

### One of the letters that was all too familiar to those who waited.

Perhaps you'll have spotted the cash difference.

Assurances have been quickly made that the money, far from being frittered away, will remain untouched in a trust fund. But, as Guy Kewney so succinctly pointed out in his Personal Computer World news column, the cash accumulated in the fund may well be taken as part of the company assets earned corporatively in the financial year 1983/84. No great effort has been made to deny any of these rumours.

Somehow there's a sheer lack of professionalism about it all. Take for example the 'Dear John' letter which was sent out to all customers who'd actually made that important move into the Cambridge corporate wallet. "Demand for the QL has been phenomenal" ran the letter hardly a valid reason for not delivering any at all. Earlier the excuse given to the Press was "development problems".

There's a feeling that the QL's grossly premature launch (the cause it's said, of much anguish amongst Sinclair's technical staff) was nothing more than a calculated attempt to beat Macintosh and Amstrad to the starting gate. But, at a time when the company is seeking useful financial results for the period 1979-1984-so that it can be in a position to go public in 1985 is it fair to use cash from expectant QL owners to boost figures, as is

rumoured to be the case? Sinclair Research keeps telling the Press that the public comes first. The public, however, may need further assurance.



### Но-Но-Но

Overheard in a local computer shop dept... Customer approaches assistant about the QL. Apparently he's already ordered his machine, but is somewhat confused about the definitions of its capabilities. He asks, "Is it a 32-bit, 16-bit or 8-bit machine?"

"Oh no sir," replies the assistant. "It's a 2-bit machine."

"I'm sorry, what was that?" "It's a 2-bit machine. One bit's the QL and the other is the bit that hangs out the back to make it work!"

All this, of course, delivered with deadpan panache.

### Rumours in The ROM

While many of us have still yet to see a working QL, let alone actually catch the postman trying to squeeze it through the letterbox, Psion is starting to hit the software trail.

As most will know, the four Psion packages come as freebies with the QL; at present they're resident on Microdrive. The plan, however, is to launch them as ROM cartridges, which would ultimately allow the user another 60K of RAM to play with. That would give a lot more scope, especially for the database package, *Archive.* 

The disadvantage of the idea will probably already have occurred to you – cost. As the packages are presented free with the system, the demand for the ROM cartridges is not likely to be huge and the method used to encapsulate programs on ROM is pricey.

Still, it is encouraging that one software house at least, albeit Sinclair Research's favourite, is thinking of using the ROM cartridge option. Since the system was first pioneered on the Spectrum (back in 1983, with the arrival of the Interface 2 unit) not one software house, other than those supported by Sinclair itself, has put its faith in the cartridge technology. Watch this space for further details.

### STOP PRESS!!! Exit The Kludge

The QL now appears to be 'Kludge free'.

Quicker than expected (and reacting no doubt to considerable customer misgivings about the rogue ROM hanging out the back) Sinclair Research has shifted the errant 16K of hardware back to where it should have been in the first place, inside the case.

Normally it takes several months to 'burn' a new ROM and bring quantity supply up to a reasonable level. Sinclair, however, has taken a quicker route and, for the time being, has kept the whole thing on EPROM, the new 16K being piggybacked onto the existing 32K.

These days, the normal retail price for a 16K EPROM is around the £9 mark; but the cost of the 32K version is something else altogether and enquiries among the cognisenti reveal a retail price (if you can find them at all) of up to £80! However, Sinclair Research claims to have 'done a good deal'.

Anyway, with the Kludge out of the way, at least the company is less likely to be mauled by adverse publicity With Uncle Sir Clive strongly touting his new wares in the direction of the BBC, it could be argued that satisfaction is now the name of the game; in addition, of course, the move releases the cartridge port for programs on ROM — all that's needed now is for the software houses to play ball.

The code for the latest version of SuperBasic is 'AH' To check whether that's what you have, Print VER\$. Those who've been blessed with the latest edition say many of the previous problems really have been erased; it's now, for instance, nothing like so easy to crash the machine.

Keep reading *QL User* in the pages of *Your Spectrum* for the latest on the 'QL without a Kludge'.

### **A Case Study**

A quick glance at a real QL shows that, although it's a little less impressive in size than the advance four-



Printer, monitor and QL — all neatly arranged in the matching black cabinet from the cunningly named Quantum Leap Systems.

colour promotion may have suggested, it's still just that bit too bulky to cram inside a briefcase. So... Middlesex company, Quantum Leap Systems, has racked its corporate brain and come up with something called the 4QL System.

Basically, it's a case for when you want to be seen around town with your latest acquisition; a terminal setup for keeping the system nice and tidy. Aimed at the executive and professional QL user, the unit has been designed to match the wonderful Henry Ford colour sense of Sinclair Research and incorporates room for a good number of the accessories that tend to accompany computers emerging from the Cambridge mill.

To achieve this startling match, Quantum Leap Systems has done a deal with a couple of interested companies, Brother and Microvitek. The result is a black Brother HR5 printer and a 12-inch Microvitek monitor built into a black cabinet, either RGB or monochrome. Compartments within the 4QL will be. available to hold the yards of cable necessary to link the whole thing together, all of which is kept discreetly out of sight during operation.

At the time of writing, things were still a little undecided on the financial side. Managing Director Mr



Hadid said, "We haven't decided on that yet – because we don't know whether we'll be selling it as a complete package, QL and all, or as separates."

Still, if you're one of the chosen few, and you'd like to bring some order to your home system – or perhaps you want to show off the QL at work – you can contact QLS's Mr Hadid at 68 Foxwood Close, Feltham, Middlesex TW13 7DL.

### **Monitoring It**

The RGB interface cable from Sinclair Research now costs about £14. For this you get a sealed 8-pin plug, two metres of cable and eight bare wires at the other end. It seemed possible to reduce this extravagance by purchasing an 8-pin DIN plug from a local shop (cost, 46p) and some cable (6-core in this case); the plan was to connect the QL to my Mitrovitec Cub monitor.

Unfortunately, things weren't as straightforward as they seemed. For some unknown reason Sinclair Research has decided to invent its own pin numbering system for 'standard' 8-pin DIN plugs which in fact is a mirror image of what you'd usually expect. And that wasn't all. It seems that Microvitec's monitors expect RGB input in a standard form and, perhaps predictably, the QL's output is a variation on that. A spokesman for Microvitec said that the company had identified the problem areas and is currently developing a modified version of its popular medium resolution monitors for interfacing with the QL

But the good news is that you can use Hitachi and Sanyo monitors right now as they stand

If you want to try and interface your QL to a monitor that you have already — but are having difficulty finding an 8-pin DIN plug — then HL Smith and Co. Ltd, 289 Edgware Road, London W2 (01-723 7595) has them.

## **THERE'S BUGS IN MY SUPERBASIC**

At last the QL is with 'us — well, some of us — but the burning question now is which version do you have. The latest AH Basic seems a giant (if late) step forward. However, those like Guttersnipe who have FB are somewhat in schtuck.

Major bugs...minor bugs, both are alive and well and threatening to disconcert new owners of the Sinclair QL. For example, when your machine has nothing important in it, try entering:

### SDATE 1984.may.10,1,1,1

which is almost the correct syntax, except that 'may should be '5'. Instead of pointing out an error, the machine locks up - very user friendly! In fact, if you replace any of the parameters by undeclared variables the QL will bomb out. But the biggest bug yet discovered on the QL is one that involves string arrays. Try and access an element of a string array that has not been defined in a DIM statement and instead of variable not found' the machine once again locks up. filling the lower window with garbage! It seems strange that, with all the extra time they had, no-one got around to testing the string arrays!

Another, more minor, bug is that the value of the line number created by the AUTO is never checked. To see this in action, try AUTO 32760. 10. The first number. 32760. is OK, but look what happens next — the number -32766 is generated, which gets rejected when you hit RETURN.

Other bugs seem to lie in the QDOS section of the firmware, particularly in the networking area. The adverts and the spec say that the QL networks with the Spectrum, but have shown that it rarely works - mainly because the two machines appear to use different standards. In addition. once you try and you can't Break; so if there is Spectrum doesn't understand, the machine particularly disastrous when you're trying to send data from one of Psion's programs - you loose all your data when you press RESET

And other gripe ... should

you inadvertantly insert a ZX formatted cartridge into a OL Microdrive, when you try and use it the machine locks up, with the motor still running. Again the consequences are disastrous if it happens in one of the applications. So much for the

accidental bugs. let's take a look at the deliberate ones — well, not exactly deliberate, but there are things in the Basic that should have been knocked on the head long ago. The most obvious is the way Basic lines are entered, the syntax checked, and then rejected with "bad line" if they are wrong. It wouldn't be so awful if you could get the line back, but it-just scrolls up and out of reach.

In fact, the Basic finally shipped to customers has changed quite dramatically from that indicated in the manuals given away at the launch. Many commands have been modified or removed completely, and a few new ones added. Inside the ROM lie the remnants of some earlier commands that were probably disabled when the 32K limit became, apparant. It seems a shame that, once the kludge arrangement was chosen with its extra 16K space, the code was not re-introduced.

There are many examples of simple changes, some of which seem quite inexplicable. For example, the original command to plot a pixel was (not surprisingly) PLOT. but at some stage it was decided to change it to POINT. This then ruled out any point function for examining the pixel colours on the screen. The original circle plotting command was CIRCLE, but there were internal disagreements on whether or not it should be called ELLIPSE; in the end by including them both

Another weird example of chosen names is DELETE. On most other systems. DELETE is used for removing lines of Basic, and ERASE for removing illes from disk. However someone decided this was

too straightforward, and chose to use DELETE for removing files, which meant creating another name for removing lines - thus DLINE was born. There is also a command WIDTH that has to be followed by a number. It was intended to specify the width of a printer attached via the serial port. but in fact it has no effect presumably because the relevant code was again scratched when the ROM began to fill.

In the original manual, a page was devoted to the WHEN command, subtitled 'exception processing', and details were to follow. However, although at some stage it was obviously decided to scrap WHEN, only some of it was removed. For example:

### WHEN ERROR 100

is accepted as a valid line, but produces a 'not implemented' error. The idea behind it was obviously the same as ON ERROR GOTO on other machines, but someone didn't like it. No longer accepted either is

### WHEN EOF 100

which would have been nearly as useful as the previous command, but it was again half deleted Another WHEN option partly removed was the form:

### WHEN VAR BECOMES 20 GOTO 100

which would have been very original, and even more useful. However, most of this one has been removed and it too is longer accepted, even by the syntax checker. Another not-so-useful feature for an array cannot be used for a normal variable. For example. if you DIMz(5) and then try LET z=10 you will be greeted with a 'not implemented' error get it is to attempt to READ a string array element along with anything else in the while READ a.b\$(2) will not work, READ a: READ bS(2) will work OK

The QL could die of software starvation unless program writers can find their way around its major weakness — the lack of a cheap medium for software distribution.

Until the advent of the QL, software for all Sinclair computers was supplied on cassette. The QL Microdrive unit, intended to replace a cassette interface, uses the same media as the Spectrum Microdrive and that's been with us for almost a year now. Despite that, there is still not one single Spectrum program sold on cartridge, although some cassettes contain 'Microdrive compatible' programs which can be transferred by the purchaser.

There are many reasons why the Microdrive has so far failed to catch on as a means of program distribution. The first is not relevant to the QL — it's just the simple fact that the market is small because relatively few Spectrum owners also have Microdrives. But you can buy programs — on cassette — which are designed to use the Microdrive. Therefore there must be other reasons why cartridges have yet to find favour.

### **Price Of Failure**

The main reason why software houses shy away from the Microdrive is cost. Blank Microdrive cartridges retail at  $\pounds4.95$  — ten times the price of computer cassettes. The wholesale price differential is even greater.

Bulk supplies of blank cartridges are distributed by Prism Marketing. In May QL User phoned the company to find out the cost of cartridges in bulk. Although Sinclair's Software Manager, Alison Maguire, says that "unlimited numbers of blank Microdrive cartridges are available," there was at first considerable confusion about whether or not Prism had any stocks at all. Eventually we were offered a minimum price in quantities of a hundred up — of £3.30 per cartridge. Most software houses pay between 15 and 25p for blank cassettes, which are - by comparison - far more widely available. (It's rumoured that the Microdrive's unit price of manufacture is around nine pence! Ed.)

### **Coping With Copying**

Another reason why software houses prefer cassettes is ease of duplication. The superficial speed advantage of Microdrive recording is eradicated when you consider that software tapes are recorded at high speed — usually 32 times the speed at which they will be replayed — on banks of equipment which make many copies at once. This equipment is fast, reliable and readily available, since it's also used by the larger music industry. Specialist firms exist to duplicate cassettes, but if you want to copy cartridges you must do it yourself.

When you copy Microdrive cartridges you have to use a standard computer system, which is not designed for heavy, non-stop use, day after day.



The lack of a cassette input on the QL could result in a nasty bout of software starvation for the new device. Simon Goodwin spells out the dangers and hypothesises on ways the software houses might be steered around their Microdrive inhibitions.

Each cartridge must be formatted before use — a process which takes about half a minute. Then a maximum of eight copies can be made at a time. Even Sinclair Research is said to use a 'daisy chain' of eight Microdrives to record the programs supplied with Microdrive systems. The cartridges must be inserted and removed by hand.

Simple though this procedure sounds, it's relatively time-consuming and it will undoubtedly make it harder to cope with peaks in demand for software. By way of comparison, the largest tapeduplicators can record and package more than half a million cassettes in a working week, using almost entirely automatic equipment.

### **Mechanical Tangles**

Another bottle-neck could be the supply of tape for blank cartridges. Only one firm in the UK manufactures the high-quality lubricated video tape required.

For those who daren't destroy a £4.95 item to satisfy their curiosity, about 17 feet of 1/16-inch wide tape is loosely coiled around a half-inch spool inside each cartridge. The tape is pulled from the *centre* of the coil, past the foam pad at the front of the cartridge, and then guided back, in a continuous loop, onto the outside of the coil.

The design ominously resembles a ¼-scale model of the old '8-track' cartridge, which became extinct a few years ago. That died out as a result of competition from the cheaper, simpler, compact cassette. It remains to be seen whether or not Sinclair has learnt the lessons of the 8-track experience.

There's little chance that blank Microdrive cartridges will become available from an alternative supplier, since the design is protected by a drove of mechanical patents. There's a waiting list of 18 months just to receive copies of the patent submissions!

Another weakness of the cartridge, in the eyes of software houses, is the fact that it doesn't travel very well. Although the casing is rigid, like a cassette, the tape can become snarled if a package containing a cartridge is

roughly handled. The high accuracy required by the drive, and the speed at which the tape moves — about two feet per second — can make unevenly spooled cartridges almost useless.

One cartridge we received through the post was so shaken that to start with it only had a usable capacity of 10K. Half an hour's non-stop formatting (erasing and re-recording the contents) was required before it had been re-spooled to hold the advertised minimum of 85K. The 'return rate' for Microdrive programs could be quite high.

### **Dodging The Drive**

In the light of these problems with Microdrives, many software houses are looking for alternative ways of loading programs into the QL. Ironically almost all of these are devious ways of adding the cassette interface which Sinclair Research has so deliberately omitted.

The simple option of plug-in ROM cartridge software has been temporarily denied by Sinclair, since early QLs are supplied with the ROM connector already occupied by the 'Kludge' (see page 7), a unit that's needed to make SuperBasic and QDOS work. Eventually this disappeared inside, but in the meantime it was not possible to add cartridges without unplugging the QL operating system. The other point is that ROM cartridges are very expensive in comparison with cassettes, and it takes a long time to get them into production.

### **Connecting Cassettes**

Turning to the tape approach, there are anumber of ways a recorded signal can be squirted into a QL. An immediate problem is getting the QL to recognise and understand that signal. In theory you could record the information sent from the 'network' or RS232 sockets and play it back through a cassette recorder. The QL can load and save via those sockets, so the problem would seem to be solved.

In practice this doesn't work. The RS232 requires a number of other signals besides the data; special hard-



The QL User suggested tape format, featuring the 17-byte header and variable length block used by the Spectrum.

ware between the tape-player and the computer would be needed to generate those signals.

The network port is single-speed, and that one speed is far too quick to allow error-free recording on a normal cassette recorder — a video recorder might be more appropriate! The same snag crops up when you attempt to induce a signal into the Microdrive tape-head via a cassette recorderdriven eletromagnet (like a telephone pick-up in reverse), instead of using a moving magnetic tape.

However, experiments with the Spectrum Interface 1 network system have shown that cassette programs can be loaded by a small software routine which reads the network socket ' instead of the cassette port. The QL network is compatible with the Spectrum version, so the same trick should also work on a QL. You can't SAVE from the network socket — the signal level is too high — but this will not be a major problem for software houses, since a simple circuit can be used to reduce the level when making master tapes.

The key phrase here is 'small software routine', because it is not possible to load programs in a cassette format until you've loaded a program to do it. This chicken-and-egg situation has prompted some programmers to design a standard loader program — supplied only on Microdrive — which can subsequently be used to load a range of other programs from cassette.

### **United We Stand**

This is an area in which co-operation between software houses could be crucial, or we will end up with a range of incompatible loading formats and the need to buy a different converter — on cartridge — to go with programs from each supplier. This would increase costs and potentially restrict choice for purchasers, removing most of the advantages of cassette duplication. Promptaction by a body such as GOSH — the Guild of Software Houses could prevent this problem, but publishers are not traditionally co-operative.

As our contribution to the new standard, QL User would suggest that cassettes should use exactly the format of Spectrum cassettes - a 17-byte header recorded at 1500 baud, describing the subsequent data, which is recorded in a variable-length block at the same rate. Although this format is not ideal, for technical reasons, it is wellspecified, easily tested and probably the most reliable cassette format yet marketed. It would also make it possible to transfer data files back and forth between Spectrum and QL, without the need for the Spectrum owner to have Interface 1.

The biggest flaw of the Spectrum tape format is the limited size of block which the Spectrum format can allow — a maximum of 65,535 bytes. In practice this need not be a major limitation, since once a single file has been loaded it can auto-run and load other sections using any other format — perhaps a 'headerless' file, as is used on many new Spectrum games. The key point is that this feature would, in theory, allow any program to be loaded into a QL from cassette.

The scheme is open to criticism because it makes 'software protection' the prevention of illicit copying — rather difficult. Since the standard code is published, anyone can imitate it. However, that criticism could be levelled at any system, since any 'loading' program must — at some point — exist in a code which is recognised by the QL, and hence copyable. So-called 'bitcopiers' — the digital equivalent of photocopiers — can be fooled by programs which load in more than one section, using a mixture of codes.

Before this standard can be adopted a number of decisions must be taken, such as which address should be made as 'zero', and how 'auto-run' files (programs that begin execution as soon as they are loaded) should be implemented. At first only CODE files need be handled.

### **Conclusion/Prediction**

Any computer is useless without software, and the future of the QL will rest upon the ready availability of programs for it. The Spectrum became a best seller because of the presence of cheap, well-written software in large quantities. Sinclair could miss a chance to repeat that success if software publishers have to rely on Microdrive cartridges alone.



If the reported figures are anything to go by, an awful lot of people have invested more than just a little bit of faith in Sinclair Research — in fact rumour has it that orders, at one point at least, were approaching £200,000 daily. And faith has been all that has kept these people going until very recently; that and the frequently trumped-up stories so often heralded in the press — computing and otherwise — all eager to cash in on what will obviously be yet another successful product.

The new device is, of course, the QL — initials which modestly stand for Quantum Leap. But no way is 'leap' the right word to describe its un-dynamic entrance into the marketplace; 'crawl' might have been more appropriate. For, at the time of writing, there are no more than a thousand of said devices actually in the hands of customers and this some four whole months after its much celebrated launch.

### What's For Launch, Uncle?

Nobody who was there at the January launch of the QL could be blamed for having 'flashed the plastic' in an attempt to stand all the front of what was to become the slowest queue in computerdom. At the Hollywood-style press shindig (at the Hotel Intercontinental, no less) the world's technical media gathered *en-masse* to see 'Mr Success' deliver the goods and, to the whirring of video cameras and the clicking of Nikons, that's exactly what he seemed to do.

Press conferences are cynical places. Everyone who attends them has seen it all before and even if they haven't, they make out as if they have. At this one, of course, it was *Sir* Clive. He'd recently been knighted for his contribution to British technology and even the newspapers were there; everyone was on best behaviour and that meant taking a professional approach to any cynicism.

As usual Sir Clive handled the press well, and from his elevated podium he quickly had them chuckling in the aisles with his unjargoned speech directed cbviously at the less technical (and more widely read) of the world's journalists. Handing over to Nigel Searle — the official Sinclair Research head on the media chopping block — the present ation was on the road.

Bolted down on a bench at the front wasthebeastthatwe'dallcometoogle and, like someone else's newborn child, we couldn't touch it - just say 'ooh' and 'aah' on cue. Televisions scattered around the room presented us with a tantalising glimpse of the wondersit was scheduled to perform - like the unseasonal high graphics demonstrationofsnowfallingdownachimney right next to a Christmas tree (suggesting perhaps that the launch was originally earmarked for some time before Santa's deadline). So astonishingly professional was the whole performance, verbal promises easily dis-



Ever since the day the news leaked out that a new device known as the QL was set to become the latest addition to the Sinclair Research balance sheet, Your Spectrum's Roger Munford has been following its progress with varying degrees of intimacy and enthusiasm. We asked him to give an editor's eye view of the story so far...



**AARK WATKINSON** 

pelled the cynicism that many had brought with them into the room; here indeed was a working machine plus four apparently fantastic business oriented software packages. Maybe it wasn't actually working from the Mic<sup>2</sup> rodrives within the device; nonetheless it was still impressive.

It all seemed to fit. Here was Sir Clive approaching a new market and, having learnt from his previous mistakes, now he was making his promised Quantum Leap into the business arena. And there it was again... that 'if you order now, it will be delivered in 28 days'. OK, so last time that hackneyed phrase was used at the Spectrum launch everyone found out that it didn't mean a hill of beans. But this time it had to be different — after all, we're talking serious computing and business with a capital B.

### There's No Business...

I never actually saw any of the experienced hacks air their flexible friends, but there must have been at least thirty orders placed at the end of that conference — and, more important than that, one or two people were seriously convinced that the QL was to be the promise that really *would* be fulfilled; I was one.

The unforgettable words of Nigel Searle "When we introduced the Spectrum we didn't know what we'd do next... and now we've launched the QL, we don't know what direction the machine will take us...", gave no indication that the first direction it would take would be straight back to Cambridge, for major re-design of the device.

After the much-publicised launch there were a couple of months of deafening silence from the company which, when you consider how much money had been put into the trust fund without the merest hint of delivery, was strange to say the least. From the journalists' point of view the only information available was that machines would be handed out for review only after deliveries had been made to customers - not so unfair when you think about it. On the other hand, there are plenty of potential customers who might quite like to get a few professional opinions before parting with over £400.

### **Gonna Write A Little Letter**

Around the beginning of March, Sinclair Research began sending out letters to expectant owners of the QL which gave the 'demand has been phenomenal' excuse for its non-appearance. A new level of confusion rattled around the industry — up until this document hit the streets, word had it that delays were being caused by 'the final stages of development'. Who was going to be convinced by this 'phenomenal demand' when Sinclair Research must have had projected figures for its popularity? Added to which, the company still hadn't managed to get even one

finished product into the hands of the waiting hordes.

Still, contact had finally been made and heavily expectant editorial offices up and down the country piled in with requests for machines to review. "We don't have any to give you, I'm afraid", was the official reply. "When?", was the weary response. "We'll put you at the top of the list", came the answer. Good news, until it was realised that this was a fairly standard comeback.

During these lean months, all the press had to go on was a brief look at the device at the press conference and, if truth be told, no-one takes much notice at a free booze-up when they're convinced that a review machine will

As usual, Sir Clive handled the press well, and from his elevated podium he quickly had them chuckling in the aisles with his unjargoned speech directed obviously at the less technical of journalists.

be winging its way to the office within a couple of days. The largish folder handed out at the 'do', (cunningly named QL Manual), was meant to throw you off the scent and keep you happy; an important part of it was Psion's section which was thorough and, without having the packages to check against, a fair guide as to what was to come.

But languages are tricky things and, presumably, SuperBasic was still very much a twinkle in a software designer's eye at this stage — especially if all the rumours were true about the late redesign of the ROM and operating system. Turning over page after page of information stamped'provisional copy' is not very encouraging for the desperate Editor who stands by material that is legal, decent, honest and truthful — yes, I am talking about journalists.

Having bent every ear in the business it must have been difficult deciding exactly how to inform an eager world about a machine that didn't really exist. Imagine the shock of finding vast tracts of the computing press tossing scruples and caution to the wind and reviewing the beast from afar. And in a way who can blame an editor for feeding hungry readers with the food they craved. Clearly they all wanted to know about a product that was going to do "what the ZX80 did for games computing, in the business computing world", to roughly quote Nigel Searle.

### Hypothetical Hype

Nothing is likely to get in the way of the 'add-ons' industry. Even now it's gearing itself up to accomodate all the needs of the QL owner which, from past experience of Sinclair products, will be many and varied.

For instance, Miracle Systems of Cambridge has already been advertising a parallel printer interface for the machine, and Xcom (Services) Ltd was in there with a QL compatible floppy disk drive — and all this a full two months before the first lucky users were ripping the brown paper off their new acquisitions. Joe The Lion has even been spreading rumours that it's well on the way to designing a device plus software which would enable punters to run Spectrum cassette-based software on the QL (oh yeah? Ed).

It's not that you don't believe such noble efforts to fill some of the major gaps in the QL's specification — or indeed, that the machine couldn't dowith a few added bits and pieces; it's just hard to see how they could have seriously expected the public to take much notice, before the machine had been delivered *en masse*. And, talking of deliveries, the latest machine to come our way had 'Issue 7' plastered on it and it was still far from finished; apart from anything else there was still 32K of EPROM hanging out the back.

Anyway, to help quell the QL customers who are still waiting for their goods, Sinclair Research has resorted to the familiar tactic of fobbing them off with 'gifts' — in this case an RS232 cable that's normally priced at  $\pounds 9.95$ , but for the purposes of being a free gift, has been re-valued at  $\pounds 14.95$ .

### **Magical Mystery Tour**

Some time ago, clearly disgruntled by all the nagging journalists, Sinclair Research decided to invite a hundred of them up to Cambridge for the day. "No, you can't bring a photographer" and "No, you can't come up under your own steam" were the rules that went with this 'official' look at the shy celebrity protected by an all but armed guard hand-picked Sinclair Research of technicians. Later, it was a sorry bunch of journalists that left that building, clutching notes that were to form the damning diatribes that have been littering the computer press ever since.

So, what can you say about a machine that, up until recently, has been just a figment of a double-page spread in all the trendy editorial places? The marketing of the QL has been shoddy, and the treatment of customers and press alike inadequate for the seriousness with which Sinclair Research would like us to take its new product. However, I'm still convinced that the machine is going to be good, and this opinion is not so much fashioned from what Sinclair is saying, but is based more on the efforts of the dedicated user-base out there that has backed up and developed previous Sinclair machines into something worth havCOMMENT

## FIRST YOU SEE

ing. Clearly there *have* been technical problems with this one. But the obvious

marketing tactics of belittling the Macintosh and Amstrad look a trifle shabby when you compare the QL launch to the more usual situation where you only go out and buy something when you're happy with the reviews — when you can look at, touch and play with the wares you have in mind to purchase. Now, having got all that off my chest, I think I'll take a ride home in my Sinclair Research electric car, and then check out what's on my Sinclair Research Flat Screen TV. Dreams...just dreams. Still it's lucky the company didn't invent the typewriter—if it had, I'd probably be carving this in stone.



Six long months in the QL-less life of an anonymous computer journalist.

### December

**Rumours abound! From** urgent phone calls placed on the last few days before Christmas, journalists are called back from their lemminglike quest to escape the city to make sure they keep January 19th of the new year free. In answer to the obvious question, Sinclair spokespeople seem to have even less idea what the press conference is about than those journalists 'in the know'. If nothing else, the announcements seem ideally timed so that no confirmation of details can be adequately investigated until a few days before the launchat present, of course, London is engulfed in the Christmas furore.

### January

The suspense has been killing! OK, everyone knew it had to be the new machine, but several of the Sunday papers have already taken it upon themselves to pre-empty the excitement by publishing details of the device; they mostly got it wrong. The day itself now shows the QL to be all we hoped it would becomprehensive, informative and, above all, exciting. The machines are as usual bolted down, so you can do little more than look; eager journalists are queueing up to book review machines and the less cvnical amongst us are handing over real money, in response to the claim that QLs will be reaching customers within 28 days. Some of us were bitten too hard last time to believe it. Sir Clive looks confident, and the daily press people are occupying themselves

with stock reports on what they're describing as the machine that will "do to the business market what the ZX80 did for the games market". Time alone will tell.

### February

Just wait till I get my machine! 'Development problems' are preventing the review QLs from being let out of the factory, but they are still promised for the end of the month. However, this clearly isn't stopping an enthusiastic computing populace from trying to get in at the top of one of the most publicised queues ever; rumours have it Sinclair Research is having to cope with up to 500 orders a day. The four-colour ads for the QL can be seen in selected Sunday supplements and computer mags, offering the promised 28-day delivery, and this time scale is indeed confirmed by the friendly telephone staff at the Camberley offices of Sinclair Research.

Meanwhile, Psion is allowing a few journalists a sneak preview of the machine – on the premise that software maketh the computer. But what's this? Reports in the more-respected areas of the computing press are beginning to suggest that all is not well within the Sinclair camp, even though all rumours are being denied.

### March

That old feeling of *deja vu* is coming over me. The 28-day deadline has come and gone and Nigel Searle is sending out letters to paying customers, telling them

that the reason no QLs have been sent out yet is because of the phenomenal demand. Dates are being given in each letter indicating when to expect the parcel, varying from April to July; some clown has noticed that no year is mentioned! Sinclair spotters have also picked up on the quickchange performed on the ad-no longer is it purporting to deliver within 28 days, instead it's claiming that delivery may take "longer than 28 days". How reassuring can you be? Needless to say, quite a few computer mag editors tell me they are getting a bit fed up of sitting on their thumbs awaiting review machines. The worm, however, has apparently turned and they are being told quite coldly that "the public comes first".

### April

Wake me up when it arrives! Seething/bored journalists have been invited up to inspect the machine in Sinclair Research's offices in Cambridge and the resulting reviews are not exactly glowing; they seem to reveal that the machines weren't ready for their final inspection which is roughly what the technicians on guard said anyway. The rumour of some kind of ROM Kludge hanging out the back has been substantiated-there it was in all its naked glory. But now ... the great news is that, according to the announcement 1000 QLs have actually been delivered to customers; review machines for journalists, however, are still noticeable by their absense.

### May

At last...today I laid hands on a real QL; friends who seem to know tell me it's an early one – and one more caustic than the rest assures me that the operating system and Basic have been changing almost by the week. Should customers be putting in bills to Cambridge for field testing of the QL?

Meanwhile Dave Tebbutt, reviewer extraordinaire, produces the 'official' benchtest in Personal Computer World (see QL User page 4 making a mockery of all the reviews already published. I get the impression that most of the latter are based on a mixture of heresay and quick investigation of the Provisional Manual. Yes, Spring has arrived and editors are coming out of the QL-less cold, swallowing their pride and admitting that the machine is worth looking at-despite the harrowing treatment from Sinclair Research.

But what are those red rings appearing on the office calendars, circling the months of August/September? Ah-ha...that's when the QL is due to lose its Kludge and really be available to anyone who wants it, within the stated 28 days. Hey! Don't put that straightjacket away!



# QL QUEST

The aim in this adventure by *Peter Shaw* is to escape the mansion with the magical gem. The objects spread throughout the building are there to help you, so use them. To move around you can use the commands 'go north', 'go south', 'go east' and 'go west' — or just 'n', 's', 'e' and 'w'. You can also 'take' or 'get' objects, 'drop' them and 'use' them. To find out what you are carrying, type in 'inventory', and to attack a monster you can 'fight', 'slay', 'kill' or 'stab' it. Your current score or strength can be found by keying-in 'print score' or 'print strength'.

Peter Shaw is something of a prolific author in the home micro arena. So far he's 'penned' Games for your ZX Spectrum (Virgin); Games for your Oric (Virgin); Getting started on your Oric (Futura); More games for your Oric (Virgin); Creating adventures on your ZX Spectrum (Interface); and Creating adventures on your BBC (Interface)  not a bad tally for a 17-year old! Peter, who hails from Stanwell in Middlesex, is now Technical Editor on Your Spectrum (a highly successful magazine that demands more from its readers) and in his spare time he's writing a program resource book for the QL owner — for Interface Publications. The adventure presented here, QL Quest, was developed in its original form over a period of nearly ten months.

<b>Lines 100-140</b> Clear and call set up routine (initial)	100 REMark QL Quest 110 REMark Peter Shaw 1984 120 REMark Andrew Pennel 130 CLEAR 140 intial
<b>Line 150</b> Define various general run-time variables	150 sc=0:ch=0:p\$="":zz=2:line_a=220
Line160 Infinite repeat to call main loop	160 REPeat infinite:main_loop
Lines 170-370 Main_loop. The main part of this procedure looks at strings using the INSTR function to find verbs like KILL or TAKE. etc. The hash-zero following the INPUT statement causes the computer to take INPUT from the lower screen so the main screen display is not confused.	<pre>170 DEFine PROCedure main_loop 180 PAUSE 50:CLS:CLS#0 190 do_room(zz) 200 IF Ch&lt;&gt;zz THEN LET ch=0 210 contents 220 monster 230 INPUT #0;"What do you want to do now? ";a* 240 IF "STOP" INSTR a*&lt;&gt;0 THEN fin 250 IF "FIGHT" INSTR a*&lt;&gt;0 OR "KILL" INSTR a*&lt;&gt;0 OR "SLAY" INSTR a*&lt;&gt;0 OR "STAB" INSTR a*&lt;&gt;0 THEN fight 260 IF "INV" INSTR a*&lt;&gt;0 THEN invent 270 IF "TAKE" INSTR a*&lt;&gt;0 THEN invent 270 IF "TAKE" INSTR a*&lt;&gt;0 THEN invent 270 IF "SCORE" INSTR a*&lt;&gt;0 THEN PRINT "Your score is ";score 300 IF "STRENGTH" INSTR a*&lt;&gt;0 THEN PRINT "Your score is ";strength 310 IF ("NORTH" INSTR a*&lt;&gt;0 OR "S" INSTR a*=1) THEN direction(1) 320 IF ("SOUTH" INSTR a*&lt;&gt;0 OR "S" INSTR a*=1) THEN direction(2) 330 IF ("EAST" INSTR a*&lt;&gt;0 OR "W" INSTR a*=1) THEN direction(3) 340 IF ("WEST" INSTR a*&lt;&gt;0 THEN use 370 END DEFine main_loop</pre>
Lines 380-750 The take procedure. This routine, although called 'take' is also used by other routines, for instance the fight procedure. The INSTR function is again used at great length to find nouns within the string a\$.	380 DEFine PROCedure take 370 FOR ob=1 TD 5 400 IF o(ob,1)=zz THEN EXIT ob 410 IF ob=5 THEN 420 PRINT "I can see nothing to take" 430 END IF 440 END FOR ob 450 IF "KNIFF" INSTR a $$<>0$ AND o(1,1)=zz THEN 460 PRINT "OK" 470 $z(zz,5)=0$ 480 o(1,1)=0 480 o(1,1)=0 480 IF "CROWN" INSTR a $$<>0$ AND o(2,1)=zz THEN 510 PRINT "OK" 520 $z(zz,5)=0$

	530 o(2,1)=0 540 END IF 550 IF "BUCKET" INSTR a\$<>0 AND o(3,1)=zz THEN 560 FRINT "OK" 570 z(zz,5)=0 580 o(3,1)=0 590 END IF 600 IF "KEY" INSTR a\$<>0 AND o(4,1)=zz THEN 610 PRINT "OK" 620 z(zz,5)=0 630 o(4,1)=0 640 END IF 650 IF "GEM" INSTR a\$<>0 AND o(5,1)=zz THEN 660 PRINT "OK" 670 z(zz,5)=0 680 o(5,1)=0 690 END IF 700 IF "NORT" INSTR a\$<>0 AND z(zz,6)=1 THEN fight2 710 IF "DINO" INSTR a\$<>0 AND z(zz,6)=3 THEN fight2 720 IF "NORG" INSTR a\$<>0 AND z(zz,6)=3 THEN fight2 730 IF "USE BUCKET" INSTR a\$<>0 AND z(zz,6)=3 THEN fight2 730 FF "USE BUCKET" INSTR a\$<>0 AND z(zz,6)=3 THEN FINT "OK";use2 750 END DEFine take
Lines 760-880 The inventory routine. This routine is called whenever the command 'inventory' is detected in the main_loop. It lists all the objects the player is carrying.	760 DEFine PROCedure invent 770 FOR a=1 TO 5 780 IF $o(a,1)=0$ THEN EXIT a 790 IF a=5 THEN 800 PRINT "You are carrying nothing" 810 main_loop 820 END IF 830 END FOR a 840 PRINT "You are carrying;" 850 FOR a=1 TO 5 860 IF $o(a,1)=0$ THEN PRINT "THE ";o\$(a) 870 END FOR a 880 END DEFine invent
Lines 890-1230 The drop procedure. This routine works in much the same way as the 'take' routine, and indeed looks very similar.	890 DEFine PROCedure drop         900 FOR a=1 TD 5         910 IF o(a,1)=0 THEN EXIT a         920 IF a=5 THEN         920 PRINT "You have nothing to drop!"         930 PRINT "You have nothing to drop!"         940 main_loop         950 END IF         960 END FOR a         970 IF "KNIFE" INSTR a\$<>0 AND o(1,1)=0 THEN         960 END FOR a         970 IF "KNIFE" INSTR a\$<>0 AND o(2,1)=0 THEN         1020 IF "CROWN" INSTR a\$<>0 AND o(2,1)=0 THEN         1030 o(2,1)=z         1040 PRINT "OK"         1050 main_loop         1060 END IF         1070 IF "BUCKET" INSTR a\$<>0 AND o(3,1)=0 THEN         1080 o(3,1)=z         1090 PRINT "OK"         1080 o(3,1)=z         1090 FRINT "OK"         1100 main_loop         1110 END IF         1120 IF "KEY" INSTR a\$<>0 AND o(4,1)=0 THEN         1130 o(4,1)=z         1140 PRINT "OK"         1150 main_loop         1160 END IF         1170 IF "GEM" INSTR a\$<>0 AND o(5,1)=0 THEN         1180 o(4,1)=z         1190 PRINT "OK"         1200 PRI
Lines 1240-1390 The contents routine. This procedure is called every time around the main_loop. It lists all objects, if any, to be found in the room. If there are any monsters in the room with you, then line 1260 represses this routine so objects can only be found after the monster guarding them has been killed.	1240 DEFine PROCedure contents 1250 PRINT 1260 IF $z(zz, 6) <>0$ THEN RETURN 1270 FOR a=1 TO 5 ' 1280 IF o(a,1)=zz THEN EXIT a 1290 IF a=5 THEN 1300 PRINT "I can see nothing here" 1310 GO TO 220 1320 END IF 1330 END FOR a 1340 FRINT "I can see;" 1350 FOR a=1 TO 5 1360 IF o(a,1)=zz THEN PRINT "THE ";o\$(a) 1370 END FOR a 1380 PRINT 1390 END DEFine contents
Lines 1400-1750 The 'intial' procedure. This routine initialises the program every time a new game is called for. The data listed to line 1750 holds information such as available objects 62 QL USER	1400 DEFine PROCedure intial 1410 RESTORE 1420 strength=100 1430 score=0 1440 DIM $z(9,6), o(5,2), o*(5,10)$ 1450 FOR a=1 TO 9 1460 FOR b=1 TO 6 1470 READ $z(a,b)$ 1480 END FOR b

and their positions, monsters and their positions and names.	<pre>1490 END FOR a 1500 FOR a=1 TO 5 1510 READ o\$(a) 1520 READ o\$(a,1),o(a,2) 1530 END FOR a 1540 DIM n\$(3,10),m(3,2) 1550 FOR a=1 TO 3 1560 READ n\$(a):READ m(a,1): READ m(a,2) 1570 END FOR a 1580 END DEFine initial 1590 DATA 0,0,2,0,1 1600 DATA 0,0,3,1,0,0 1610 DATA 0,0,0,4,0,2 1630 DATA 0,0,0,4,0,2 1630 DATA 0,0,0,4,0,2 1640 DATA 0,0,0,7,4,0 1650 DATA 0,0,0,7,4,0 1660 DATA 0,0,0,7,4,0 1670 DATA 0,0,0,0,0,0 1680 DATA "CROWN",4,0 1700 DATA "BUCKET",7,0 1700 DATA "BUCKET",7,1 1740 DATA "NORGH",7,1 1760 REMark ROOMS START HERE</pre>
Lines 1770-2150 The do_room (room) procedure. This is a SELect ON routine to print the room description. Notice how the room number has been passed into the procedure using SuperBasic's powerful extended procedure command, i.e. proc_name (variable).	<pre>1770 DEFine PROCedure do_room(room) 1780 SElect DN room 1780 SElect DN room 1780 SElect DN room 1790 siPRINIFRINT "This is the west wing of the house." 1800 PRINIFRINT "There are exits east and south." 1810 = 1820 PRINIFRINT "There is a beautiful fountain in the alcove to the north "; 1840 PRINT "and there are exits east and west." 1850 = 1840 PRINT "and there are exits east and mest." 1850 = 1840 PRINT "And there are exits east and open doorway north. Beware, d o not o " 1860 PRINT "north unless you have completed your task!" 1890 = 1900 PRINT:PRINT "This is the Inner Chamber." 1910 PRINT:PRINT "This is the Inner Chamber." 1910 PRINT:PRINT "This is the Inner Chamber." 1920 PRINT "north and east. There is also a stairway to the south." 1930 = 1940 PRINT:PRINT "The Library." 1950 PRINT:PRINT "The lot pray." 1950 PRINT:PRINT "The lot pray." 1950 PRINT:PRINT "The is very cramped in this small room, and the only exit i s west." 1970 = 1970 = 1700 PRINT:PRINT "This is the State Bedroom." 2020 PRINT:PRINT "The so the State Bedroom." 2020 PRINT:PRINT "The only exit is through the window, west." 2030 PRINT:PRINT "The only exit is through the window, west." 2040 PRINT:PRINT "The so the Balcony." 2040 PRINT:PRINT "This is the outside world." 2040 PRINT:PRINT "The so the the date window, west." 2040 PRINT:PRINT "The only exit is through the window, west." 2040 PRINT:PRINT "The so the balcony." 2040 PRINT:PRINT "This is the outside world." 2040 PRINT:PRINT "This is the outside world." 2040 PRINT:PRINT "The people now think of you as their here!" 2040 PRINT:PRINT "The only exit is through the window, west." 2040 PRINT:PRINT "The only exit is through the magical gem." 2040 PRINT:PRINT "The only exit is through the magical gem." 2040 PRINT:PRINT "The beople now think of you as their here!" 2040 PRINT "Nou have not fulfilled your purpose. The gods have vapourized you - a Ta." 2040 PRINT</pre>
Lines 2160-2210 The 'fin' procedure. This routine is called at the end of the game to print the outcome, the player's score and the player's strength.	<pre>2160 DEFine PROCedure fin 2170 PRINT:PRINT "You managed to score ";score 2180 PRINT "with a remainder of ";strength;" points!" 2190 PRINT:INPUT "Press enter for another game ";g\$ 2200 RUN 2210 END DEFine fin</pre>
Lines 2220-2280 The 'use' procedure. This is a unique command handling routine; that is, it will not be called more than once during any one game. Commands like 'use' add interest to adventures; they provide alternative methods to solving a problem, rather than just having to 'drop the knife, kill the monster and go east'.	2220 DEFine PROCedure use 2230 IF zz<>S AND (o(4,1)<>0 OR o(3,1)<>0) THEN 2240 PRINT "You can't use that 'ere!" 2250 main loop 2260 END IF 2270 take 2280 END DEFine use

Lines 2290-2350 The 'use2' procedure. The second part of the use command.	2290 DEFine PROCedure use2 2300 z(5,3)=6 2310 score=score+30 2320 PRINT "A door yawns open east." 2330 PRINT:PRINT "Hurry, it will close if you're not quick enough!" 2340 GO TO 230 2350 END DEFine use2
Lines 2360-2530 The 'monster' routine. This procedure is called every turn, to print out the actions of any monsters in the room.	<pre>2360 DEFine PROCedure monster 2370 IF z(zz,6)=0 THEN RETurn 2380 PRINT "Look out, there's a ";n\$(z(zz,6)) 2390 PRINT "In this room!" 2400 PRINT "The ";n\$(z(zz,6));" attacks" 2410 FOR p=1 TO 100:NEXT p 2420 IF RND*strength&gt;=20 THEN PRINT "but you escape his clutches":RETurn 2430 PRINT "and he hits!" 2440 FOR p=1 TO 100:NEXT p 2450 IF RND*strength&gt;=30 THEN 2450 IF RND*strength&gt;=30 THEN 2460 PRINT "Your weakened, but your still alive." 2470 strength=strength=RND(30) 2480 ELSE 2490 PRINT "With one fell swoop the monster cleaves your skull." 2500 FINT "You are dead." 2510 fin 2520 END IF 2530 END DEFine monster</pre>
Lines 2540-2680 The direction (dirc) procedure. This checks to see if there is an exit in the direction you want to go. If there is, the procedure will happily return to the main_loop, otherwise it will tell you that there isn't an exit in that direction and go back to the start of the main_loop.	2540 DEFine PROCedure direction(dirc) 2550 IF z(zz,dirc) THEN 2560 PRINT "OK." 2570 zzez(zz,dirc) 2580 ELSE 2590 PRINT "You cannot go "; 2600 SELect ON dirc 2610 =1: PRINT "north" 2620 =2: PRINT "south" 2630 =3: PRINT "east" 2640 =4: PRINT "west" 2650 END SELect 2660 END IF 2670 main_loop 2680 END DEFine
Lines 2690-2730 The 'fight' procedure. When you want to attack a monster, this routine is called to find the outcome. If you are carrying a certain object you have a distinct advantage — that is, you never miss the monster when you strike, and you have to actually be carrying the object to kill it.	2690 DEFine PROCedure fight 2700 IF z(zz,6)=0 THEN PRINT "There's nothing here to fight!":main_loop 2710 GO TO 700 2720 END DEFine fight 2730 DEFine PROCedure fight2
Lines 2740-2810 The 'fight2' procedure. The continuation of the fight routine which prints the ongoing results of your battle.	2740 PRINT "You attack" 2750 PAUSE 100 2760 IF RND>.6 THEN hit 2770 IF o(1,1)=0 THEN hit 2780 PRINT " but you miss." 2790 strength=strength-INT (RND*20)+5 2800 main_loop 2810 END DEFine fight2
Lines 2820-2910 The 'hit' routine. If you manage to clobber the monster, this routine tells you and decides whether the blow was strong enough to kill.	<pre>2820 DEFine PROCedure hit 2830 PRINT " and you hit!" 2840 PAUSE 100 2850 score=score+5 2860 strength=strength-INT(RND*20)+15 2870 IF o(1,1)=0 AND strength*RND&gt;50 THEN kill 2880 IF strength&gt;200 THEN kill 2890 PRINT "But the monster is still standing." 2900 main_loop 2910 END DEFine hit</pre>
Lines 2920-2970 The kill routine. If you manage to kill the creature, this routine is called to increase your score and take the monster out of the game.	2920 DEFine PROCedure kill 2930 PRINT "You have slain the dreaded creature." 2940 z(zz,6)=0 2950 score=score+50 2960 main_loop 2970 END DEFine kill
Lines 2980-3000 The 'boh' routine. A special routine which can't be explained without giving too much away.	2980 DEFine PROCedure boh 2990 PRINT "The magical bucket jams itself onto Dino's head. The dragon falls onto the floor gasping, Dino is dead." 3000 DIR mdv1_

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