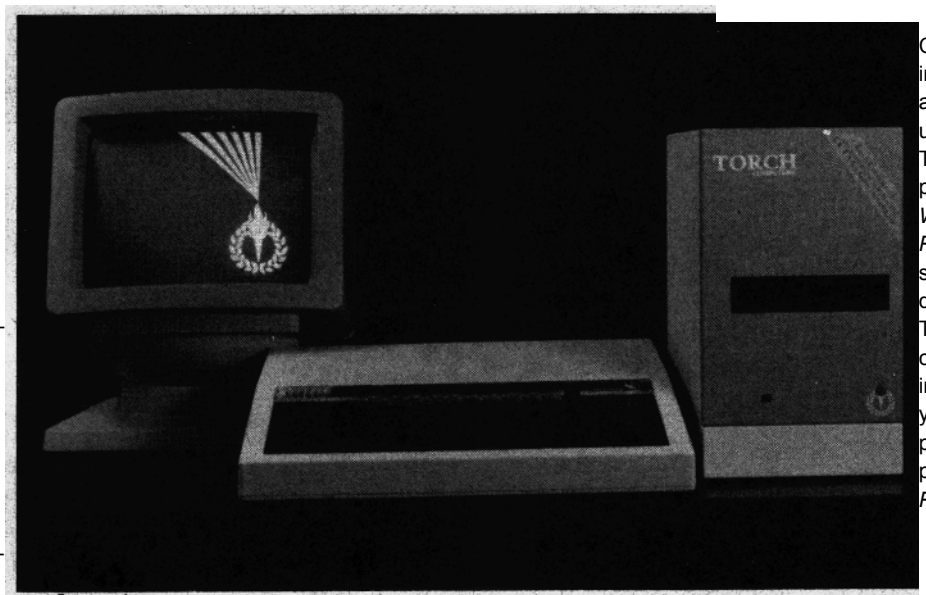
UNICORN: CHEAPEST ROUTE TO UNIX

Andrew Cummins and Peter Vole test Torch's 16-bitter

THE Unicorn system from Torch is a good deal more expensive than other second processer systems, but it gives you something special for your money. The system given for review contained a 68000 (16-bit) second processor with a quarter megabyte of RAM (256k), a Z80 processor with 64k of RAM, a 20Mb hard disc drive, and a single 5¼in floppy drive with a slimline profile, similar to one you may already have connected to your BBC micro, storing up to 400k. The whole package sat in a buff-coloured box that stood on one of its ends beside the BBC micro, looking rather like a squat tower 7½in wide, 10iin deep and 12½in high.

It had to be connected to the BBC micro not only via the Tube, but also through the 1MHz bus (for the hard disc) and the disc drive port (for the floppy). This took about 20 minutes to sort out, and left the squat tower of -the Unicorn a few inches from the right hand side of the BBC — close, but not so close as to interfere with typing. The fan in the Unicorn was pleasantly quiet; it was a while before we noticed it at all.



A Unix combination: monitor, Beeb and Unicorn box containing 68000 second processor, Z8 processor, 20Mb hard disc drive and 5¼in floppy drive

Normally, on receiving a Unicorn system the user would have to load the main Utilities (CPN, Perfect software, and Unix — more on these later) from the dozen or so floppy discs. This exercise might well take a day if you encountered problems, but fortunately we were spared the exercise: Torch had already loaded up the hard disc with everything. Once that is done, it should not need to be repeated, short of disaster. The only other thing to be done is to put a ROM in the BBC micro in one of the spare slots. Then you are ready to go.

First impressions of using the Unicorn revealed some good, some bad features. We were using a colour monitor and found the mode 1 80-column display the best to use. This would not have been acceptable on a TV, so a monitor is really necessary, preferably a good resolution monochrome monitor— you are unlikely to need colour. It is in fact quite easy to issue instructions to the BBC (which is acting here as a front-end processor, chief cook and bottle-washer to the 68000) from within the CPN environment to change the screen background colour, mode or anything else.

Less satisfactory was the way that the Unicorn ignored several obvious special features of the BBC micro. For instance, the ESCAPE key was not used, as it clearly should be, to generate the normal escape code of Unix (^C).

More serious was the fact that the BREAK key was left in normal operation. It is difficult to make sure that pressing the BREAK key leaves all processors and disc drives in a reasonable condition: difficult, but not impossible. In our opinion it should have been done. The Unicorn, like all Unix systerns, is constantly swapping data in and out of disc, and pressing BREAK as often as not left the hard disc corrupted.

Paging mode (CTRL-N) was switched off, and could not be changed. Small points like this, making use of the best features of the BBC micro, could make the difference between the Unicorn being a joy to use and being frankly annoying.

Once the Unicorn is connected and working, the user is interacting with the CPN operating system running on the Z80. To anyone familiar with CP/M 2.2 this will not bring many surprises. All the utilities you would expect are there. We found this part of the system easy to use and the documentation first-class.

Supplied to run under CPN is a package of integrated business applications programs under the Perfect label. There are three programs, the *Perfect-Writer* word-processor, *Perfect-Calc* spread-sheet, and *Perfect-Filer* database program. These have a standard command structure and inter-workable files, as you would expect of a property integrated package.

Perfect-Writer and *Perfect-Calc are* both quite adequate, the wordprocessor being analogous to *Wordstar* but including a spelling checker and mail-merge facilities. *Perfect-Filer* is *a fairly* simple database program.

Documentation was again excellent with tutorials available on-screen if required.

The command inputs and printer drivers were configurable, but there was no real evidence that the packages had been tailored to use any features of the BBC microcomputer: it was

really just acting as a CPN terminal.

The main feature of the Unicorn is its low-cost approach to providing Unix. If you have a BBC micro ard want CP/M plus applications software, you will probably get a second processor from Acorn or elsewhere. The person who buys the Unicorn is paying a lot more and is presumably looking for more, namely the Unix programming environment.

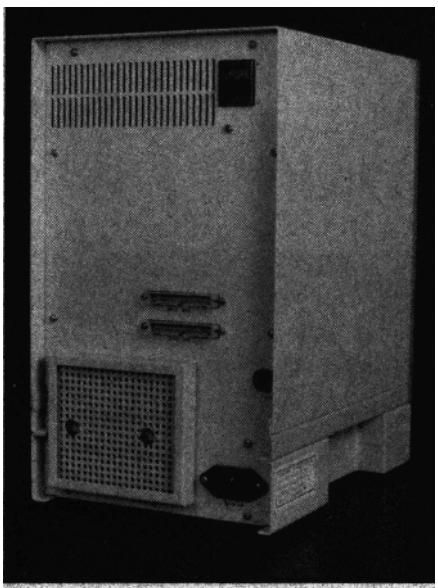
For those unfamiliar with Unix, it will be useful to give some idea of what it is (or should be) and what it does. Unix is not just another operating system (like CP/M) or even a super-operating system. Originally designed in 1969 as a multi-user scheduling program or time-sharing system, it has come to include so many, powerful tools and utilities that it is probably the programming environment *par excellence:* not so much a system, more a way of life. The only comparable environment I've come across is the Structured Programming Facility now available on IBM and Amdahl mainframes.

Unix; however, has been around a lot longer than SPF, and, because its 'kernel' is written in the high-level language C, it has spread rapidly to every level and type of computer. Anyone who can provide a C compiler and some machine-specific routines to handle dise drives, I/O and so on can put Unix on their machine. Now it is becoming available on microcomputers. In ten years' time, the megabyte micros we all hope to have will almost certainly provide Unix or a descendant of it.

What does it do? A good Unix system should provide compilers/interpreters for all the well-known languages Pascal, Basic, Fortran, Cobol, C (of course) and perhaps more specialised languages such as Lisp. It gives the user a convenient hierarchical file structure that keeps his files separate from those of other users**,** protecting access by means of passwords. It provides a large number of utility programs–usually several hundred in all–that can be called up by a simple command from the keyboard. And the commands in turn can be combined or altered by the user at will, to create new commands to his own specification.

The people who created and developed Unix were programmers. They wanted the kind of power that normal operating systems, then and now, have a habit of denying programmers - ;who, after all, are the ones who actually use operating systems. If you've ever, looked up something in a manual, found you can't do it, and said to yourself 'Why not?', then Unix was made for you.

The result Is thatUnix is very flexible, very powerful; rather complex, and potentially dangerous. For instance, the commands tend to be terse, that is, short two or three-letter abbreviations. This makes Unix somewhat more difficult to learn than your average micro-computer Basic, but less frustrating to use once one is adept. The whole Unix system is now sufficiently complex for even an experienced user to overlook the best way of doing something, or: simply do it wrong. Unix is not realty a system for the beginner in computing or the business person with a smattering of computer literacy. It is a pro- grammer's tool, not an executive toy: Unix is like a blunderbuss in that it is easy to shoot yourself in the foot unless you are careful. If you know what you are doing, it will help you to lick programming problems faster than you ever knew you could.



Back of the Unicorn box showing connections to 1MHz bus and disc interface, with power switch (top) and cable connection (bottom right)

Just to give a taste, here are some of the utilities available on the Torch Unicorn Unix, and any other decent Unix system. You have the choice of several editors including 'ed', which is fairly simple, and 'vi', which is, if anything, too powerful. You have 'sed, a search-and-replace editor.

The number of file manipulation programs is enormous. You even have programs that allow you to create your own computer language and compile programs in it, as well as being able to run programs in any of the existing common languages. You can create your own commands, either by combining existing commands or from scratch, using C. There is 'nroff', a text formatter, and 'sccs', designed for software project control.

You have full control over your filing system, I/O, and the destination of the output from any process. Fundamental to Unix, in fact, is the idea of stringing programs together so that the output of one becomes the input of the next, the implications of this in text-processing applications are mind-boggling.

You can set up one program to run in 'the background while you get on with something else. If you don't like the command structure (' shell', in Unix jargon) you are working in, pick another– or create your own. Unix is all about freedom and power, breaking down barriers to what you want to do rather than creating them, as other more limited operating systems frequently seem to do.

It all sounds wonderful, and indeed it is. People who get to know Unix well usually have nothing but praise for its power and flexibility, and if you are already a Unix user you will probably not need convincingl

The Unicorn, however, is a rather speeial implementation of Unix. If you already own a BBC micro with disc interface and high-resolution monitor, it will be the cheapest way of getting hold of Unix. Even if you don't own a Beeb it is still a cheap route to Unix. The problem is that, to some extent, you only get what you pay for. The power of Unix carries a cost, in terms of memory requirements and speed, that the Unicorn is barely capable of meeting.

Unix is entered from CPN by typing 'unix'. There follows a long logging-in sequence, in which the tie big disadvantage of running Unix on the Unicorn becomes quickly apparent. Everything takes much longer than one is used to on bigger machines (or with less ambitious systems on smaller ones), even though only one person at a time cam use the Unicorn.

The reason for the slowness is partly that the system I was given, had 'only' 256k of RAM for the 68000to use, and upgrades to 512k or 1Mb (available towards the end of this year, according to Torch) would allow easier caching of the hard disc transfers. However, another feature of the design is also fundamentally responsible for` the slowness; the hard dise (and the floppy' too) are not controlled directly by either the Z80 or 68000 processors within the Unicorn box. Instead they. are connected separately to the BBC micro through the 1MHZ bus and the disc port respectively.

In the case of the hard disc, this presents a severe bottleneck for transfers from the disc to the Unicorn processors. All data has to go via the 1MHz expansion port, through the 6502 in the BBC micro and back out along the Tube to the 68000. This eonvoluted journey is

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necessary, according to Torch, to attain compatibility with other products. A sound reason, but it slows down the operation of some Unix facilities to an almost unacceptable extent.

In other words, the 256k memory and 8MHz 68000 processor are just about capable of handling Unix suceessfully; put the bottleneck of the 6502 between them and the vital hard disc, and some processes become seriously delayed:

This problem might be overlooked were it not for the way it interacts with other, apparently minor, deficiencies. We have already mentioned that pressing BREAK loses the whole Unix session, and this is more annoying when it takes four minutes (no less!) to log on. When using the screen editor 'vi', the regular transfer of data to disc, unnoticeable on most systems, takes about three seconds on the Unicorn: This means that suddenly the letters you are typing fail to appear on the sereen, and a three second delay occurs before they do, all in a rush. This happens once a line, not once a page. Since the whole idea of a screen editor is that the things you type appear on the screen immediately as well as going to memory, this is somewhat annoying.

Given that Torch is unlikely to change the architecture to the extent of eliminating the hard disc bottleneck, the company could perhaps recognise the data transfers to make them less intrusive in the contect of interactive processes sucn as text input and editing. This is a relatively minor change, and the kind of tning Torcn snould have put right much earlier. For non-interactive processes it is not so annoying, thougn it still slows things down.

Otherwise the Unicorn provides an impressive, low-cost introduction to Unix. All tnat you might expect is there (even YACC, the Unix compiler-compiler) bar the tutorial and manual facilities usually found on big systems. These would have used up too much disc space, and Torch wisely decided to concentrate on good-quality printed manuals rather than wasting disc space putting the information in the machine.

The slowness of the hard disc transfers belied the speed of execution of the 68000: timing tests showed that it was doing okay provided it didn't have to wait for the 6502 to transfer a big lump of data for it. Usually that was the downfall of the execution times:

Overall the system was impressive but slow. Torch has one or two things it should definitely sort out (principally the BREAK key and the regular hang-ups in ' vi' for disc transfers), but the problem of the slow hard dise transfers is probably built-in. It will be interesting to see what happens in a 512k or 1Mb machine.

A good buy? Possibly. There are systems costing less than twice the price that I think are probably twice as good. But there is no route to Unix quite as cheap as the Unicorn. When the Acorn 16032 second processor comes out, ostensibly providing Xenix (from floppy discs?) at around the £1,000 mark, Unicorn will no longer be the cheapest. Even then, however, it seems likely that we will be getting roughly what we pay for in every case.

The likely market is difficult to pin down. The Unicorn is not really for business use, unless the business happens to be software or at least has somebody around who can make use of Unix. It cannot be used by more than one person simultaneously, but is out of reach of all but the richest hobbyist. The serious systems programmer or small software house is the most likely target, and the university or college microcomputer section. Yet for most of us it will probably seem too slow.

So you might be a foolish virgin to go for Unicorn. On the other hand, it is one way of becoming a wise virgin, in the sense of getting genuine interactive experience of Unix.

The trouble is, to achieve tne wisdom of Solomon, you may need the patience of Job.