

Acorn ABC 310

Whether or not the Acorn bubble has burst remains to be seen, but the company has resolutely produced a range of machines that it hopes will attract users at the top end of the single-user business market. Peter Bright assesses the capabilities of the range's senior model, the ABC310.



Acorn Computers has been one of the success stories of the British home computer market. After the company was awarded the contract to build the BBC Micro it went from strength to strength, especially in the educational market where the BBC machine dominates at the lower levels of schooling.

But recently the good times have turned sour for Acorn: most schools, now have their quota of BBC Micros, and the Electron home computer hasn't sold as well as the company hoped. This led Acorn to a financial crisis which, with the aid of Olivetti, it is trying to resolve in an attempt to get back on the straight and narrow.

A major part of Acorn's strategy, at least prior to its financial problems, was its new range of business machines, designated the ABC range. This spans from a basic terminal, through scientific machines based on the National Semiconductor 32016 CPU, to the 300 and the 310 — powerful business machines based on the Intel 80286 processors.

Reviewing the machines while the company's financial position is being reorganised makes it hard to give a final opinion. But the machines themselves are interesting enough to warrant close inspection — so we decided to look at the top-of-the-range model, the ABC 310.

Hardware

The main difference between the 300 and the 310 is that the 300 comes with two floppy disk drives whereas the 310 has a hard disk.

The overwhelming first impression of the ABC 310 is one of sheer ugliness. Instead of the traditional design of separate boxes for the processor/disks, display and keyboard, Acorn has housed all the electronics, the disk drives and the display in one box. The



The ABC310: 'a vastly oversized monitor on a tilt-swivel stand'

result is a machine which looks like a vastly oversized monitor on a tilt/swivel stand.

The main problem is the sheer size of the unit. Complete with the stand, it measures 16ins high by 15¼ins wide by 15¾ins deep, which makes for a very bulky casing that isn't helped by a slab-like grey and black colour scheme.

It's also interesting to note that those who saw the unit in the office commented on how old-fashioned it looked, especially the keyboard which looks very dated. Again, this is partly due to the size of the machine.

The net effect of this design is that the

machine completely dominates any desk it is placed on. While this is also true of other powerful micros like the IBM PC/AT, you usually get the option of placing the main system unit on the floor to free desk space. The ABC 310 gives no such option.

Most of the front of the machine is dominated by a black panel that surrounds the display tube, beneath which are the disk drives and below them, the Acorn badges. The back panel houses a wide range of I/O ports which are arranged on four levels in an apparently random order.

From the top, there is a nine-watt DIN



The keyboard has an old-fashioned, chunky appearance which deviates from modern styling trends

BENCHTEST

socket designed to take a mouse, and a British Telecom-style socket marked 'BT Link'. Presumably this is for a modem, but it wasn't connected to anything on the review machine.

Next there's a Centronics printer connector which, unfortunately, is of a non-standard design and requires a special cable.

At the third level are two large D sockets. One 37-way socket is labelled '1MHz Bus'; the other is a 25-way socket for the keyboard connection.

The fourth level provides four round DIN sockets and a 15-way D socket. The four DIN sockets give RGB monitor output, an RS423 serial port, a cassette tape port and an Econet network port. The D socket is labelled 'Analogue In'.

Those who are familiar with the BBC Micro will have noticed that many of the interfaces are exactly the same as those found on the ABC 310. There's a good reason for this — one of the boards inside the unit is very close in design to that on the BBC.

Getting inside the ABC 310 is simplicity itself. All you do is unclip a couple of quick-release straps on the back, unclip the front and pull off the top casing. For all inquisitive types, a word of warning should be issued here. The first thing you see when you take off the top casing are the electronics for the monitor, most of which are uncased. Some of these electronics use very high voltages and can hold their charge for some time after the unit has been switched off, which makes messing around inside this machine more dangerous than it usually is on a business micro.

The basic architecture behind the whole ABC range is broadly the same: all the machines are based to some extent on the electronics of the BBC Micro. The BBC comes with a special I/O port called the 'tube' built in which



The disks can read and write many different formats

allows a second processor to be connected to the computer. When this is done, the BBC 6502 processor is only used to handle I/O, disks, keyboard, and so on. It's the second processor which actually runs the applications program! By using the tube, Acorn has been able to design boards based on a wide range of processors and so develop different products which contain very powerful co-processors but which are based on the Beeb.

The second processor on the ABC 300 and 310 is an Intel 80286 as used in the IBM PC/AT.

Gaining access to the ABC 310's computing electronics is quite straightforward once you have discovered where Acorn has hidden the boards.

As stated, the majority of the space inside the casing is taken up by the monitor electronics and the tube; this is all housed in its own substantial chassis. The computing electronics live in three main areas. The BBC PCB lies below the monitor chassis, and the co-processor and various I/O controller boards lie in two panels, one each side of the monitor chassis. To gain access to the co-processor and I/O controller boards, you release four quick-release studs and the wings housing the PCBs hinge outwards.

To get at the BBC circuitry, you release two more studs and hinge up the whole monitor chassis. When the unit is opened up in this fashion, it looks as if it has been dropped from a



The back panel houses a wide range of I/O ports which are arranged on four levels in random order

great height and has disintegrated!

The review ABC 310 contained no less than five PCBs, all connected by lengths of ribbon cable glued onto them.

As is so often the case with review machines, my ABC 310 was a preproduction lash-up; I don't expect the production versions to have the cables secured in place with Araldite.

Close inspection of the BBC PCB revealed that it isn't a BBC PCB! Acorn re-designed the PCB and the whole layout has changed, so the board in the ABC 310 has no less than eight sideways ROM sockets and provision for double-density disk drives. On the review machine, four of the ROM sockets were filled by an advanced DFS ROM, utilities ROM, network controller ROM and an old OS 1.00 ROM.

The 80286 co-processor board is a very minimalist affair. Apart from the main processor, the PCB just holds some discreet TTL logic, RAM, 32k of ROM and a Ferranti ULA which controls the tube. The review machine came with four banks of eight 256k RAM chips, making a total onboard capacity of 1Mbyte.

The ABC's modular approach is both an advantage and a drawback. The advantage is that it's easy to upgrade the system by plugging in the appropriate co-processor and controller boards. The disadvantage is that the system becomes a messy cat's cradle of ribbon cable which makes it physically larger than it would otherwise have been.

The review machine came with one 790k 5¼in floppy disk drive and one 10Mbyte half-height hard disk. The floppy disk drive can read and write a number of different formats, including 360k IBM and 380k CP/M (for compatibility with lower-end ABC machines). Although the hard disk worked OK, it combined with the built-in fan to make this system one of the noisiest I've ever tested — it drove me mad.

The keyboard is another odd feature. While most modern machines are moving towards low-profile styling, this keyboard looks old-fashioned and chunky.

The keyboard unit attaches to the main unit via a coiled cable and a 25-way D plug, and has enough cable to allow it to be used on a desk or on your lap. Although the casings are made out of plastic, the keyboard is quite heavy and feels sturdy enough to take a fair amount of abuse. The keys are laid out in a fairly standard manner. The main qwerty typing section takes up most of the left side of the unit; to its right is the numeric keypad, and above it are 10 programmable function keys.

The keyboard also comes with three LEDs. Two of these indicate that CAPS LOCK and SHIFT LOCK have been

activated, but unfortunately they are not labelled and it's up to you to determine which means which.

On the back of the keyboard unit there's a rocker switch and a button: the button resets the system and does a warm boot; and the rocker switch is used to switch the 80286 co-processor on and off. Normally it would be switched on, but if you want to use the machine as a BBC, you can switch off the co-processor and the ABC turns into a very expensive BBC Micro. An LED on the top of the keyboard indicates that the co-processor is switched on or off.

Apart from its old-fashioned looks, the keyboard operated well enough. The keys feel and sound rather loose, but generally it looks as if it can take long-term usage.

The display monitor is built into the main unit. A quick look inside at its electronics reveals that it is built by Microvitec, which makes a wide range of monitors, and as such it's a fairly standard 80-column by 25-line colour monitor. Brightness is controlled by a small thumbwheel under the front of the main unit.

When the machine is running CP/M, the screen's graphics resolution is the same as mode 0 graphics on the BBC. However, if you do use the machine in BBC mode, you have access to all the different BBC modes and resolutions.

In use, the monitor worked well. The whole system unit is mounted on a tilt/swivel stand, so it's possible to adjust the viewing angle to suit you. The tube has been treated with an anti-glare coating which worked well.

System software

System software on the ABC 310 depends on the mode the machine is working in. If you have the co-processor switched out, then the machine behaves in a similar way to the BBC. When I typed *HELP, I was told that the review machine was supplied with the out-of-date OS 1.0 and various ROMs, including an advanced DFS. As the BBC board's cassette port is accessible from the rear panel, I tried to load some

cassette-based BBC software to see if it would run. Acornsoft's Elite was my first attempt. This quickly bombed out with an error message to the effect: 'This isn't a real BBC, sonny.' I persevered with other random BBC cassettes and scored a 50 per cent success rate.

Obviously, few people will fork out for an ABC 310 and then use it as a BBC Micro.

The standard operating system of the 80286-based ABC 300 and 310 machines is Digital Research's (DR) Concurrent DOS 286. Unfortunately, when I was writing the Benchtest, DR hadn't finished writing DOS 286 so I had to make do with Concurrent CP/M version 3.1.

At this stage, it might be useful to explain the current state of DR's operating systems. Its current main 16-bit operating system is Concurrent CP/M; this allows you to run up to four different programs at the same time (concurrently—hence Concurrent CP/M). Concurrent CP/M also goes some way towards emulating PC/DOS and MS/DOS, so programs written for the IBM PC or MS-DOS machines can sometimes work on machines using Concurrent CP/M. Version 3.1 of Concurrent emulates the old version 1 of PC/DOS, and version 3.2 of Concurrent emulates the more popular version 2 of PC/DOS.

Now enter the Intel 80286 processor as used in this machine and the IBM PC/AT. The 80286 can work in two modes under software control: it can either emulate an 8086 family processor as used in the IBM PC; or it can work in its own native mode which includes an enhanced instruction set and advanced memory management facilities.

When IBM launched the PC/AT, it also launched PC/DOS version 3 to work with the new processor. This uses the 80286 in 8086 emulation mode and doesn't take advantage of its enhanced facilities. In an attempt to cash in on this weakness, DR is soon to launch Concurrent DOS 286, which will make full use of the 80286's new features and will offer enhanced IBM emulation. This is the operating system that the ABC 300 and 310 will be shipped with.

But, as stated, the review machine was supplied with a lashed-up version of Concurrent 3.1. However, even in this state, the machine showed some degree of IBM compatibility. It happily read IBM disks and even ran friendly, well-behaved IBM format programs such as WordStar.

Another feature of the ABC 300 and 310 is that they'll be shipped with DR's Graphics Environment Manager (GEM), which is an extremely user-friendly Macintosh-like front end to the operating system.

Using GEM, you shouldn't ever have to resort to the unfriendly operating

Benchmarks	
DM1	0.3
DM2	1.3
DM3	2.4
DM4	2.4
DM5	6.0
DM6	6.7
DM7	10.7
DM8	8.6
Ave	4.82

Minimum recorded Parallelizing of the Benchmark programs: 4.82
1st January 1988

system command line.

GEM makes heavy use of the mouse, icons and pull-down menus to make life as easy as possible for the user. I looked at the system in more depth in February's issue, so I'll only make some brief points here.

The interesting thing about using GEM in conjunction with a concurrent operating system is that you can have up to four applications programs running at the same time, as well as having a friendly user interface. Concurrent CP/M handles concurrency by having four 'virtual screens' which you can switch between at will. Each virtual screen has its own piece of memory where the program is loaded, and shares processor time with the other virtual screens.

When you use GEM on a concurrent system, the obvious thing to do is to load a copy of GEM into each of the four virtual screens. Then, when you switch screens, you will be greeted by GEM rather than the CP/M command line. The problem with this is that it would need a hell of a lot of memory to take four copies of GEM, and it would be very wasteful. Instead, the system loads one copy of GEM which is 'shared' by each

Technical specifications

Processor:	Intel 80286, 6502
ROM:	32k co-processor, BBC board, eight sideways ROM sockets
RAM:	512k, up to 1Mbyte onboard
Massstorage:	790k floppy disk, 10Mbyte hard disk
Keyboard:	92-key full-function
Size:	16ins x 15 $\frac{1}{4}$ ins x 15 $\frac{3}{4}$ ins
I/O:	Parallel printer, 1MHz bus, RS423 serial, Econet, analogue port
DOS:	Concurrent DOS 286

In perspective

Selling for a shade under £4000, the ABC is positioned firmly at the top end of the single-user business market. In terms of price and performance, it's bound to be compared with machines like the IBM PC/AT, but at the moment it doesn't have the same multi-user capability as the PC/AT.

Acorn is planning to sell the ABC range through 50 or so dealers under the 'Business Centre' banner. It wasn't clear at the time of writing how many dealers are already signed up and how many are still thinking about it. Most of Acorn's current dealers are geared more towards home machines than £4000 business micros, and wouldn't be suitable.

Acorn also seems to be hedging its bets by attempting to sell the machine into vertical markets as well as the general-purpose machine market, but I'm not sure if this is the good idea it seems. The trouble with the vertical market tactic is that the same idea seems to have struck all the 'second division' business micro manufacturers at the same time.

It isn't hard to see the reason for this: the general-purpose business market has become very competitive with the real money being made by the likes of ACT, Apple and IBM. Most of the rest have been having a hard time, and have turned to other areas in which to sell.

I have the feeling that this mass attack on the vertical market will eventually reduce the returns in this area, thereby forcing the likes of Acorn to specialise even further.

The company can, of course, fall back on the university-type educational market, but here the 300 and the 310 will be competing with Acorn's National Semiconductor 32016-based ABC machines as well as products from other companies.

of the screens. This technique is known as 'reentrancy'. Its advantage is that it is more efficient, but its disadvantage is that programmers have to be more careful when they are writing re-entrant programs because each of the four virtual screens will be doing different things within the GEM program. The programmer must make sure that all the entrances and exits from the program are properly controlled in order not to mess up the system.

Applications software

The only pieces of applications software supplied with the review machine were WordStar and Locomotive Basic (Locomotive also provides the Amstrad's Basic). If you take a look at the Basic Benchmark table, you'll see that the ABC 310 is a very fast machine indeed. This is hardly surprising when you consider that it has an 80286 processor and was running Locomotive Basic, which has a reputation for speed anyway.

As far as third-party software is concerned, a great deal depends on how many independent software vendors Acorn persuades to translate

software to the ABC machine. Acorn says it hopes to sell the machine into vertical markets, which means that it will have to persuade specialised software writers to write for the machine.

It will be interesting to see how many write for the GEM environment and how many just write for unfriendly old CP/M.

As far as IBM compatibility is concerned, DR says that Concurrent DOS 286 will have extensive IBM emulation capabilities. If this is the case, the ABC should benefit considerably, but I can't say more until I see the operating system.

Documentation

At the time of writing, Acorn hadn't finished the documentation for the machine so there was none supplied. The company did, however, supply DR's generic manual for GEM, but even this was pre-release and so not representative.

Prices

The same type of machine as the one reviewed here with an 80286 processor, 512k of RAM, a colour screen and a 10Mbyte hard disk costs £3999.

Conclusion

I can't quite make up my mind about the ABC 310. Technically it is fine — the 80286 processor combined with the 6502 on the BBC board make it a very fast system indeed. But the sheer size of the thing makes it an intimidating sight in the average office.

The inclusion of Concurrent DOS 286 rather than the more traditional MS-DOS is a brave idea. It looks as if Concurrent DOS 286 will be much more powerful than MS-DOS, and it has the major advantages of making full use of the 80286 and the ability to run more than one program at once.

The only problem with the operating system is the comparative lack of 16-bit software. If the IBM emulation capabilities of DOS 286 are as good as claimed, then it should be possible to run plenty of IBM applications software on the machine.

Acorn says that it has also commissioned specialist independent software writers to write for the machine. This is fine, but I expect it will take some time for the software to come through.

The inclusion of the GEM friendly user interface with the ABC 310 is a nice addition. There's no doubt that GEM is much easier to use than the traditional CP/M command line; the only question is whether software developers will make full use of its facilities, or just write their applications in the traditional way.

But even assuming that the right applications software is available for the machine, I still say that I wouldn't like it on my desk. It's just too big. END