Aleph One PC Expansion Card

The Archimedes has an illustrious history and a big presence in schools and colleges. What it doesn't have is the software. Simon Rockman looks at a solution that lets you run both your existing programs and PC applications.

Driving through Liverpool one time I managed to get myself hopelessly lost in a one-way system. Spotting a policeman, I asked him how to get to the address I had on a business card. 'You can't get there from here. You're better starting from somewhere else,' he said, removing a traffic cone and telling me to bump over the curb.

Sometimes you're here and you have to get there; sometimes you've bought an Archimedes but need to run that critical PC application that will solve all your problems. It seems daft to buy a second machine with a second screen and a second keyboard, so you investigate ways of getting that software to run on your Archie.

It seems a bit of a shame — no, it seems a lot of a shame to fit a PC card to an Archimedes. When mice and a graphical user interface were avant-garde the Archie had them. When scaleable fonts were a neat idea the Archie had them. And there are things PC users are looking forward to which Acornophiles regard as normal. Networking as standard, a RISC processor and pre-emptive multitasking. In time, mainstream computing will catch up. We'll see DEC Alpha machines running NT but they are still many, many months away. And there are some RISCOS things which will be special even then: things like anti-aliased fonts.
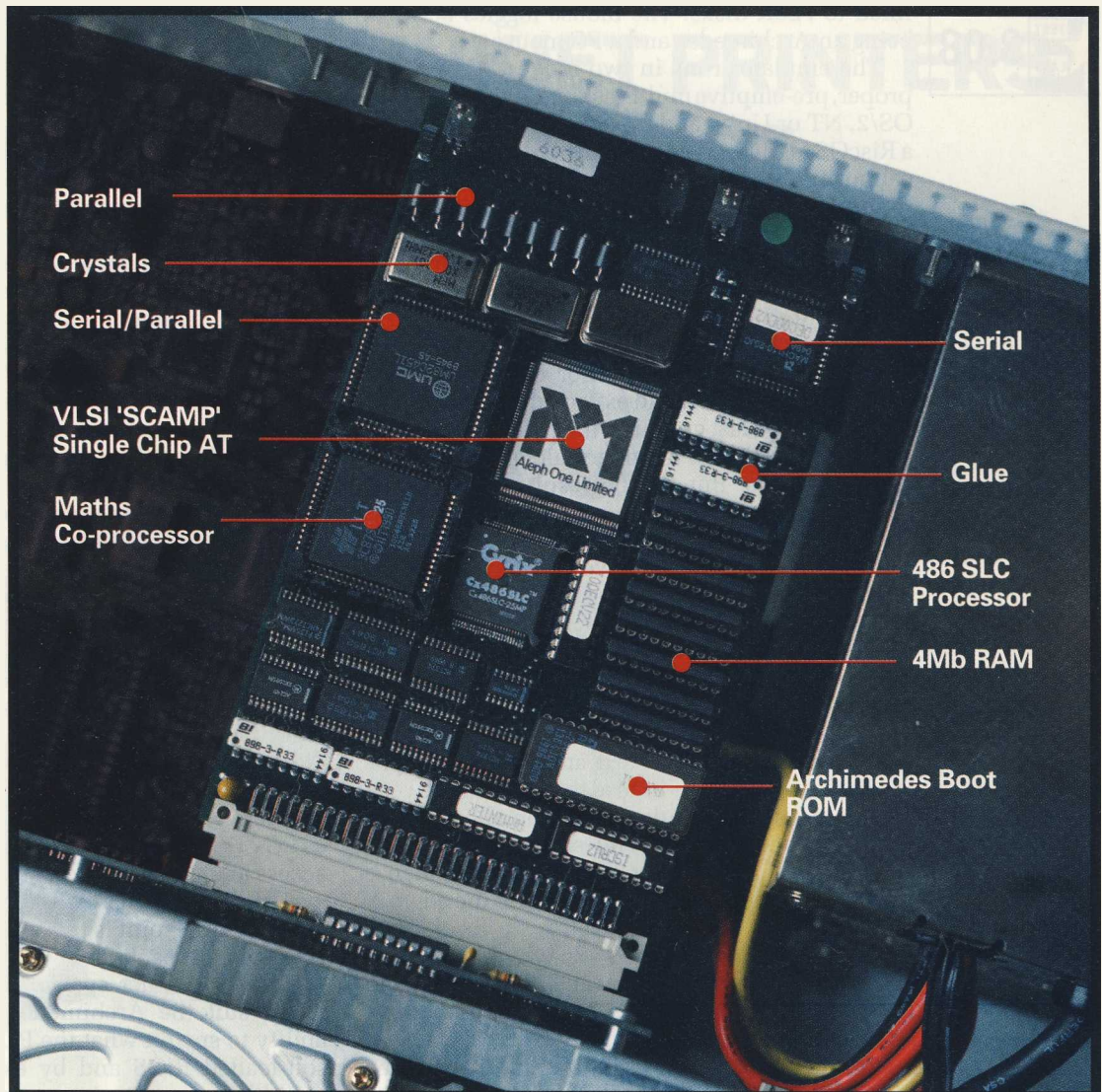
But for all its technical trailblazing the Archie has a problem — software. The argument that you only need one good word processor, one good spreadsheet or one good project management program is often trotted out by aficionados of OS/2, NeXT and other struggling formats, but history has shown that success is on the side of the good software catalogues. One of the most impressive things about the rise of Windows has been its ability to steal the hearts, minds and processors of the business community without versions of WordPerfect and Lotus 1-2-3 available at launch. Software matters and the Archie doesn't have it. The PC does.

The picture changes if you are talking about schools software. Acorn's dominance of the education market has led to a good choice of educational programs, many of them written by the schools and colleges which use them. So schools which have Archimedes computers are loth to give them up in favour of something more mainstream, something which might make students more employable. What they need is a solution that will run both the existing base of Archimedes programs and PC software. Acorn offers a software solution but like most software emulators it is slow, and is dogged by problems running programs which don't play by the book.

The Aleph One PC Expansion Card is a hardware solution which cuts down the problems of making an Archimedes look like a PC. While PCs tend only to be able to deal with data and files from other PCs, most of the rest of the computing world has a more enlightened view when it comes to pretending to be something else. So Apples can read PC disks, STs can pretend to be Macs, and Amigas play at being PCs. There have been PC emulators for Macs: the MacCharlie turned an early Mac into a PC when Charlie Chaplin was the icon IBM associated with. The Aleph board (the name comes from the first letter of the Hebrew alphabet) is quite like the Amiga bridge board in that it plugs into the machine and can run DOS as a task within the main operating system. There are differences of course, mainly dictated by the host hardware. Amiga 2000s have PC/AT-style slots and so the bridge board could make use of PC cards. The Amiga was also better at piping data between the host and the parasite, but then the Archimedes wasn't designed with the eventual intention of running PC software while the Amiga 2000 was.

The board is called a 386 PC Expansion but the review model uses a Cyrix 486SLC. This chip has been covered in detail in a previous review but briefly it is a direct replacement for a 386SX. The

chip is pin-compatible and has a 16-bit bus with a 32-bit internal architecture like a 386SX. The justification for the 486 name is a 1K cache on the chip. The 486 has a few more instructions than the 386 and three of these concern the 8K cache on a pukka 486. The 486SLC shares all the 486 instructions and so the name sticks. Unlike a 486DX but in common with the 486SX the Cyrix 486 does not have a numeric co-processor. This support is offeredby a separate chip which can be (and was) plugged into a socket on the Aleph card. The 486SLC is ideal for applications like this which want improved per-formance over a 386SX without hav-ing to redesign the board. The name is confusing: Tandon sells a desktop ma-chine with this proc-essor as a 386 while the Tandon note-

Parallel
Crystals
Serial/Parallel
VLSI 'SCAMP' Single Chip AT
Maths Co-processor
Serial
Glue
486 SLC Processor
4Mb RAM
Archimedes Boot ROM

book is called a 486. Either way, what matters is the performance. Cyrix and independent parties agree that it will match a 50MHz 386... if anyone made such a part.

Installation and construction

Installation is simple: a few screws to remove the case, a couple to take the backing plate off the machine and press the card home. Like an Apple NuBus card this is a much firmer connection than a PC board. Acorn used to call the cards podules but decided that was silly, so now they are just expansion cards. Much of the cleverness of the system is in software written by Ian Harvey, a man who worked tirelessly to solve problems we encountered with our Eurotest benchmarks.

The hardware is neat, fitting a PC onto the board without any space wasted. The heart of the machine, and what makes it possible, is the VLSI SCAMP (Single Chip AT Microprocessor Peripheral) chip, the VL82L310, which sits in the middle of the board. This is a PC on a chip and combines most of the workings of a PC in a single package. Next to it is the Cyrix 486SLC (a 386SX version of the card is available and is cheaper). The entry level card is supplied with 1Mb RAM but is expandable (as the review card was) to 4Mb by using SIPs.

Space precludes the use of SIMMs. These three components make a PC; there is some glue chippery but beyond that most of the space is devoted to I/O.

In common with early PCs, the Archimedes (which predate the A5000, itself launched last year) don't have bi-directional parallel ports and so won't work with dongles. The solution to this has been to include a bi-directional port on the card. This is complemented by a serial port and the accompanying chips and crystals to run them, the only part which might mislead the PC chip-spotter. The ROM which might reasonably be assumed to be the BIOS is an Archimedes boot ROM. The BIOS lives on the Archimedes hard disk. The Aleph One board uses the same mechanism as the Acorn software emulator for sharing data between the PC and Archimedes sides of the system. A partition on the hard disk is used for the PC side. The Archimedes can read and write to this but the PC cannot access any of the Archimedes areas on the disk. Anyone who has been using the Acorn emulator should be able to upgrade without losing any data. Services which are not catered for on the board, like the keyboard, mouse, real-time clock and drives, are supplied by the Archimedes. The A5000 and newer machines have floppy drives which are capable of reading 1.44Mb floppies; otherwise you're con-
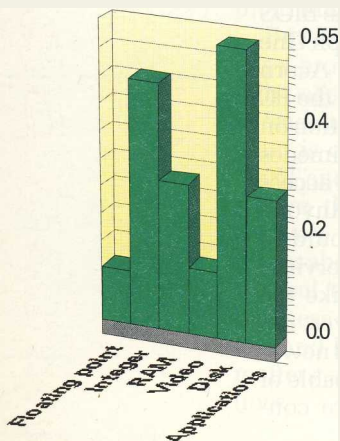
3.08

fined to 720K disks. The mouse toggles between being an Archimedes and a PC mouse.

The emulator runs in two modes. RiscOS is a proper, pre-emptive multi-tasking enviroment (like OS/2, NT or Unix) and the PC can be set to run as a RiscOS task in a Window. The only things which cannot multi-task with the PC are those which need to access the DOS partition. The time-slicing slows down the system and the graphics are slowed dramatically by the Archimedes' use of the machine. The alternative is to single-task. The Archimedes side freezes, just supplying things like graphics to the PC. In effect it becomes a video board surrounding a processor card. I was surprised at the results. I had expected the machine to have lightning fast graphics: the ARM chip is great at the kind of block moving which is needed for quick graphics. But, as the results graph below shows, the screen update rate is poor, even in single-tasking mode. There are two reasons for this. The Archimedes doesn't have a text mode, which is no great loss: modern PCs are plenty fast enough to work without this legacy of the 8088-based PC. But some of the low-level benchmarks hit the hardware quite hard in text mode: one EGA test failed to work, which makes the figures a little unreliable. Some of the applications (notably Lotus 1-2-3) also flip between text and graphics mode. While this all works — indeed the flipping between modes looks better under a bitmapped-only environment since the monitor doesn't have to re-synch — the pixel-by-pixel approach is slower than a character-mapped system and so takes the edge off the speed.

A more serious consideration which affects the speed of screen update is that all BIOS calls have to be trapped by the Archimedes side and then translated into Archimedes graphics calls. If this was instant it would be no faster than a direct video 25MHz machine. As the Archimedes, for all its power, still takes time to run the software and draw the pixel, it is a little slow. When the RiscOS with its windows and clipping has to be taken into account it all gets very slow.

While the video failed to live up to expectations, the disk access is impressive. The Acorn disk controller is much more tightly linked to the IDE, ST506 or SCSI hard disks than a PC, and the I/O between the card and the drive is very much simpler than that needed for graphics. This led to impressive disk figures, although some credit for this must go to using a small (30Mb) partition on a large hard disk. The use of partitions has a second

little disappointing for a machine fitted with a maths co-processor. It is easy to get blasé about fast machines, and anything which scores much less than 6 on the ECP scale is deemed slow, but for the price of the Aleph board you could buy a 486SX machine with a monitor, hard drive and case. What you can't do is run Archimedes applications and cut and paste between DOS and RiscOS. For a lot of people a separate PC will be a better solution. If you haven't got a computer yet then look at a PC instead, but if you have an Archimedes or, more likely, work in an establishment which has a number of them, then the Aleph board makes sense. It is ideal for teaching things like AutoCAD (albeit a little slow), Lotus 1-2-3, dBase, WordPerfect and Windows. There are special Windows drivers, which help improve the performance but are still slow when multi-tasking with RiscOS, but getting into the single-task mode is a matter of a single click.

The Aleph board makes even more sense if you have any Archimedes peripherals. There is support from the card for RiscOS printers; some Archimedes printers use a direct connection. There is already limited support for these, with full support pending. Other planned enhancements include a disk cache using the Archimedes RAM, a RAM disk, Novell network support, and an emulator to simulate the RM Nimbus, which is not identical to a PC but is popular in the schools market.

The system will support RiscOS CD-ROM drives as PC CD-ROMs; this gives the educational market access to many more magazines on disk which are available for the native Archimedes system. One major selling point is the ability to run the schools management package SIMS.

There are other specialist applications which might suit the Archimedes/PC crossbreed. The ability to spy on what the PC side is doing from a soft-loaded BIOS and by examining all the I/O could be a boon to anyone developing low-level applications and having trouble debugging the system.

Conclusion

A couple of months ago PCW reviewed RocketShare, a system which allowed Macintosh owners to run a Mac within a Mac by, effectively, having a Mac on a card. You can run as many Rocket boards as you have slots, so what looks like a single machine on a person's desk becomes five. The Aleph board could be adapted to do the same. Windows doesn't multi-task as well as RiscOS and multiprocessing NT is some way away; fitting four boards to an Archimedes could solve some problems for people who want to run several processor-intensive PC tasks at one time.

Many potential users will look at the price of a separate PC, the advantage of having something with PC slots, and head straight for Tottenham Court Road. But for a large number of Archimedes owners the Aleph One board is a useful addition allowing them to get from where they are to where they need to be.

The PC Expansion Card is available from Aleph One on (0223) 811679. Prices: 1Mb 386SX £395, 1Mb 486SLC £495, 4Mb RAM expansion £100, maths co-processor £99, Windows drivers £25.

bonus: a small, read-only boot partition can be used to get the machine running with all the transient data going into a larger DOS partition. This provides a good level of protection against viruses, and will prove popular in educational establishments where there is little control over what goes into machines. Early on in our testing a dose of the Form Boot Virus casued problems, but then Form is pretty harmless and it was soon dealt with using standard PC utilities. There is a limit of 512Mb on a RiscOS partition but it is unlikely to be a problem in the short term.

Overall the ECP rating of 3.08 was a