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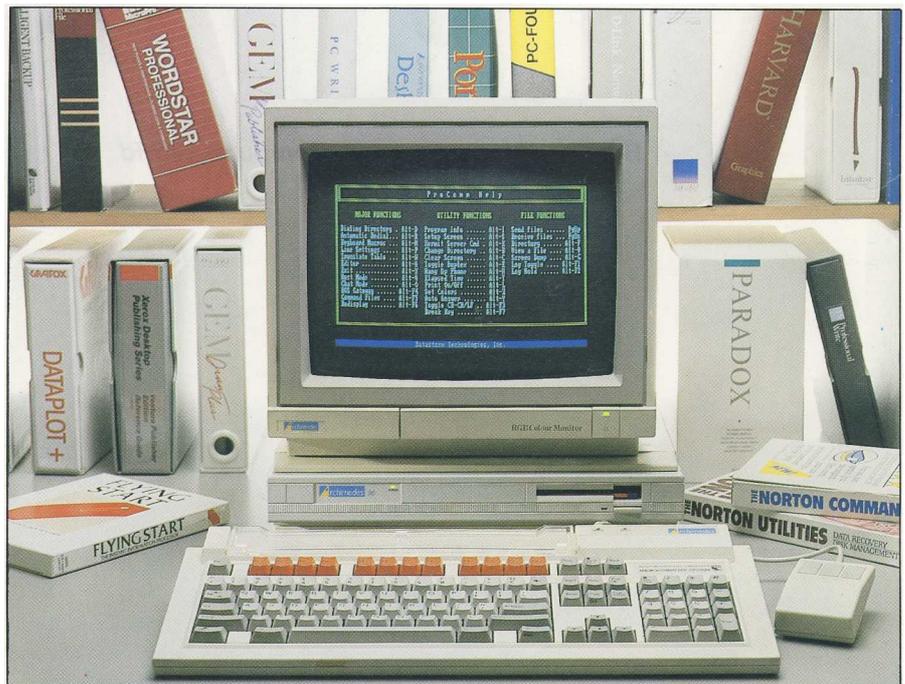
Archimedes PC Emulator

PC emulators are not new, but so far they have had limited success in their job of enabling your chosen micro to run PC-compatible software. Simon Jones unveils Acorn's PC Emulator package for the Archimedes range of micros to see how well it performs in action.

At this year's PCW Show, Acorn proudly displayed its PC 'Emulator' package for the Archimedes range of computers, which is claimed to allow packages written for the IBM PC to run on an Archimedes. Acorn was demonstrating the Emulator running dBase III+ and Lotus 1-2-3 at the show and, as I only managed a quick glance at the Emulator then, I was pleased to get the opportunity to examine the product at close quarters. Having seen other attempts at PC compatibility, such as pc-ditto (reviewed in *PCW*, October) I was sceptical to say the least.

The Archimedes carries on the Acorn tradition, having a lot in common with the BBC Micro and the BBC Master series. Indeed, the Archimedes will run most of the 'well-behaved' software written for the BBC computers. However, the Archimedes and the BBC micros differ radically in the CPU they use and the amount of RAM available.

Based on Acorn's RISC processor, the Archimedes 440 is *blindingly* fast and, with 4Mbytes of memory, it is not short of space — a problem which caused the downfall of the BBC Micros. All Archimedes machines come with ADFS, Acorn's Advanced Disk Filing System. This uses a hierarchical directory structure much like MS-DOS, but, unfortunately, many of the command words in ADFS are used to perform opposite



functions to those in MS-DOS. This is more than a little confusing if you are constantly switching between PC applications and Archimedes ones.

One other minor irritation that springs to mind is that, while the Archimedes has a keyboard laid out like IBM's AT-E, its use of the backspace key is confusing. The keyboard has 12 function keys across the top, a numeric keypad on the far right and a cluster of cursor keys and mis-

cellaneous keys between the main group and the numerics. The backspace key [\leftarrow] is where you would expect it to be for a PC, at the top right of the main keyboard. But, for some reason, the Archimedes uses the key marked 'Delete', found in the cursor cluster, to do the work that Backspace ought to do.

I think Acorn could have done better here. The AT-E keyboard layout is one of the better ones of recent

years, and it's a pity that the backspace key does not perform the same function as on the PC keyboard. This is the case on the Archimedes keyboard but — lo and behold — in the PC emulator, both the backspace and the delete keys work as they should. Backspace deletes the character to the left of the cursor and the Delete key deletes the character at the cursor.

The Emulator package came on two 3½in floppy disks. These contained the Emulator software and a copy of MS-DOS 3.21. The programs were tested on a prototype Archimedes 440 and a production model 310. The 440 version of the Archimedes has 4Mbytes of RAM and a 20Mbyte hard disk, making a very impressive beast indeed. I particularly wanted to try the emulator on the 440 to see how it worked with the hard disk. As the 440 is not yet available, I was supplied with a preproduction machine. The 310 is available now. It has 1Mbyte of RAM and one floppy disk drive. You cannot run the Emulator on a machine with less than 1Mbyte of RAM.

With 1Mbyte of memory, only 384k can be used for your PC programs. Acorn claims that when Arthur version 1.2 is ready (Arthur is the rather quaint name Acorn has given to the operating system of the Archimedes) you should have 512k available for PC programs. The Archimedes takes some of the remaining memory for the screen map, some for its operating system, while the Emulator program itself uses 186k. On a machine with 4Mbytes, however, a full 640k is available for the PC programs.

MS-DOS can't be held on the same disk as the Emulator programs because the Archimedes uses a different disk format to MS-DOS. Archimedes disks hold 800k of data while 3½ in MS-DOS disks hold just 720k. There is no provision for the 1.44Mbyte standard of Apricot's Xen PC/S machines or IBM's PS/2 models 50, 60 & 80. Those machines can, however, write 720k disks and all software distributed on 3½in disks will be in 720k format.

If you want to transport data from 5¼in MS-DOS disks to 3½in MS-DOS disks, then you're going to have to buy an add-on drive or a serial cable and some communications software. As far as I know there isn't an add-on 5¼in drive available for the Archimedes yet, but there are plenty of adverts about for 3½in add-ons for PCs. A third alternative is to send your disks away to a company who will do the conversion for you. This is useful for one-off jobs but not really practical for everyday use.

Installation

To start the Emulator on a machine with only floppy drives, you put the Emulator disk in one of the drives

and type 'PC.EMULATE'. The program loads and then counts through the available memory to see how much it can use for PC programs. The Emulator then prompts you to insert the MS-DOS boot disk. Once MS-DOS has been loaded you are presented with the familiar A> prompt — and the Archimedes is magically transformed into a PC.

CONFIG.SYS and AUTOEXEC.BAT files work as you would expect them to and, if you include the ANSI.SYS device driver in the CONFIG.SYS file, you have full control over, for example, the prompt and screen colour. The screen display thinks it's an IBM-compatible CGA card and gives 80x25 text and graphics in 16 colours but cannot cope with blinking text, making the background brighter instead. This seems like a sensible option until an application decides to show some text as blinking white on cyan. The Emulator will interpret this as white on bright cyan, making the background text virtually illegible.

Another small point is that the colour brown is displayed as a murky sort of yellow, but then, IBM insists that its 'yellow' is in fact bright brown. You cannot set the border colour either. The screen on an Archimedes is usually 32 lines deep, but the PC Emulator uses only the middle 25 of them. This makes the display much wider than it is high and could be a problem if you wanted to draw circles, for example, as they would come out squashed!

The package comes with a small program to install the Emulator programs in a directory on the hard disk and reserve 10Mbytes for PC files. If, like me, you don't have 10Mbytes free on your hard disk, or you don't want to give half of your disk over to PC files, you can edit this Basic program to reserve less space. The program has enough comments in it to work out what is happening and change the amount of space to be reserved. There are warnings about sticking to an integer multiple of the cluster size, but if you use nice, easy figures like 2½ or 5Mbytes, you can't go far wrong.

I encountered an extra problem with the installation in that, although I had 5Mbytes free, it was not all in the same place. The Advanced Disk Filing System insists that all files are held in contiguous blocks. When I ran the installation program, it failed to find a free space big enough to put the 5Mbyte partition in. The program stopped with an error report saying 'Compaction Required'. 'Compact' is an ADFS utility which shuffles files about on a disk to bring all the free space together. It works very quickly and without problems.

After I had run Compact, the, installation routine worked and I was left with a directory called PC on the hard disk of the Archimedes. This

directory contained three files, EMULATE, ROM and DRIVEC. EMULATE is the main PC Emulator program and ROM is the Archimedes version of the BIOS chip on a PC. (The BIOS is the Basic Input Output System and is at the core of what makes a PC a PC.) Both these programs are written in ARM assembler.

The third file, called DRIVEC, is the PC Emulator's part of the hard disk. To MS-DOS it looks like a complete hard disk drive and functions just like one, only very fast. (See 'Technology' box.)

Next, the PC partition must be described and MS-DOS installed on it. These steps are done from MS-DOS so the emulator must be loaded again. The MS-DOS disk that came with the emulator contains all the DOS utility programs. One of these is called FDISK and is used to describe DOS partitions. There is also a batch file called HDINSTAL which will format the DOS partition and copy all the utility files into it. This process only takes a minute or two and then you no longer need the floppy disks to, start the Emulator.

Typing PC.EMULATE from the Arthur prompt will run the emulator program. When it asks for the MS-DOS disk, you simply press the space bar and it looks first at the floppy drive and, finding no disk present, looks on the hard disk to find the operating system.

In use

In use the Archimedes PC Emulator program gives quite acceptable performance if you don't want to go too fast. While the hard disk access is extremely fast, the computing speed is only average and the screen display speed is slow. With, some, applications the disparity between the different speeds is more marked than others. With programs such as PC Outline you get a performance on a par with that of a cheap PC clone. With dBase III Plus you tend to notice, when requesting a record from a file, that the disk drive light blips on for a fraction of a second and the screen display takes about five seconds to complete. But dBase III Plus does not have a fast screen display, even on an 80286 machine.

Most applications will probably run with acceptable speed providing you don't want to drive them too hard; I even had GEM up and running. GEM Desktop Publisher and GEM Draw Plus both performed faultlessly, if a little slowly. Very few programs presented any problems at all. Communications packages such as ChitChat and ProComm can both drive an external modem, through the Archimedes' serial port, at up to 2400 baud. The serial port has a nine-pin D-connector as on most ATs. Turbo Pascal and GWBasic both worked well. PC Tools and X-Tree,

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two hard disk organiser packages, both coped with the Emulator's hard disk arrangement. Even memory resident programs like SideKick and device drivers such as RAMDrive worked, and DESQview performed multitasking quite happily. The only program I really had any problems with was Word Perfect Executive.

Word Perfect Executive is a suite of programs from the Word Perfect Corporation, designed for busy executives and their portable computers. It contains a spreadsheet, appointment calendar, address book, calculator and a cut-down version of the famous Word Perfect word processor. Every part of the suite worked without a hitch — except for the word processor. This would load OK but would freeze at the first touch of a key. Very frustrating. Acorn put this down to the machine being a pre

production model Archimedes. The same fault manifested itself on the model 310, though, which was a proper, finished version. Acorn said that this was because there wasn't enough free memory on the 310.

I did have some interesting problems with the mouse and wondered if the PC emulator would be clever enough to interpret calls to a mouse driver and redirect them to the mouse on the Archimedes. After all, the Archimedes comes with a mouse as standard; it would be silly to have to do without it when running the machine as a PC.

My first attempt did not raise much hope. An apparently standard Microsoft mouse driver, MOUSE.COM, crashed the emulated PC. MOUSE.SYS fared no better when installed as a device driver in the CONFIG.SYS file. I tried again with

another version of MOUSE.COM. Acorn assured me that it would work; it didn't. In frustration I rebooted the Archimedes and restarted the emulator. MOUSE.COM loaded without a hitch and, on starting GEM, I had a mouse-driven pointer. Hooray!

My elation was short-lived. The pointer would only move within the centre portion of the screen. It would not go to the far left or right of the screen, which meant that the menus on the left were inaccessible. Even worse, the area that the pointer would move in shifted slowly over to the right. After a couple of minutes, the pointer was confined to the far right quarter of the screen. Something was decidedly wrong.

Acorn reiterated the opinion that the problem was with the prototype machine I was using. Acorn has MOUSE.COM working on its machines and is having talks with

Microsoft about distributing the program as part of the emulator package.

Technology

Running Norton Advanced Utilities SI (SysInfo) gave the following results:

Copyright Notice : (C) ACORN 1987
Operating System : DOS 3.21
Main Processor : Intel 80188
Co-processor : None
Video Display Adaptor : CGA
Current Video Mode : Text, 80×25 Colour
Available Disk Drives : 3, A: — C:
Serial Ports : 1
Parallel Ports : 1

DOS Reports 640k of memory:

58k used by DOS and resident programs
582k available

A search for active memory finds:

640k of main memory (0000-A000)
16k display memory (B800-BC00)

Computing Index (CI) : 0.8
Disk Index (DI) : 36.9
Performance Index (PI) : 12.8

Compare these figures to those for a standard PC/AT clone:

Computing Index (CI) : 7.7
Disk Index (DI) : 1.6
Performance Index (PI) : 5.6

The performance index is meant to be an overall indicator of the speed of the machine being tested. It's not a very good indicator for the Archimedes as its meagre performance for the computing index shows much more than the phenomenal hard disk access speed.

Running PC-Tools System Information gave the following results:

PC Tools R3.10 System Information
The BIOS Programs are dated — 22/07/87
Operating system — DOS 3.21
Number of logical disk drives — 5
Logical disk drive letter range — A thru E
Serial Ports — 1
Parallel Ports — 1
CPU Type — 80188
Relative speed (orig PC = 100%) — 215%
Maths co-processor — No
User programs are loaded at paragraph — 1F42
Memory used by DOS and resident programs — 59808
Memory available for user programs — 595552
Total memory reported by DOS — 640k
PC Tools has found total memory to be — 640k
Colour Graphics Adaptor present

Documentation

The installation leaflet supplied with the Emulator was a photocopy of what will be shipped in the final version. It consists of seven A5 pages. One page of introduction is followed by a page on installation, three pages on MS-DOS commands and a final section on how to install the Emulator on a hard disk. Finally, a short list of useful books on MS-DOS and PCs is given.

Conclusion

The PC Emulator program does make an Archimedes look remarkably like a PC. There is a wealth of software available for PCs now, and if you need to run PC programs occasionally on your Archimedes, then this is the way to do it. There really are very few compatibility problems, but, as always, if you want the Emulator to run a particular piece of software, get the dealer to show you it running before handing over your money.

Admittedly, the Emulator is a little on the slow side. But if it's speed you're after, then perhaps a proper PC would be better for you. 'Ah!', said the nice man from Acorn, 'There'll be an 80186 co-processor card out for the Archimedes soon.' When that arrives, it promises to be a 'winner', he said.

The PC Emulator for the Archimedes costs £99 plus VAT and is available from Acorn on (0223) 245200.

Simon Jones is a computer specialist with Project Sigma at South Bank Polytechnic, London. In 1981 he bought a BBC Micro: this original machine is still working perfectly. **END**