# How To Buy Motherboards

*Looking for a new motherboard? Choose carefully, because the past few months have seen an explosion of new technology, faster processors and more powerful chipsets.*

*By Dave Cook*

There is nothing worse than buying a new PC only for it to turn into yesterday's technology within months. Unfortunately, it's a scenario that has become all too common thanks to the many different types of processors now available, as Intel and AMD do battle to win the mother of all chip wars.

The result is a plethora of products, built to diverse specifications and running at different clock speeds and front-side bus (FSB) settings. To complicate matters even further, Central Processing Units (CPUs) such as the Athlon, Pentium III, Celeron and K6 require motherboards that are very different to each other.

No wonder the motherboard is considered to be the most important part of the computer. It houses the CPU and its second-level cache (L2), the chipset, BIOS, main memory, integrated chips, ports for keyboard and mouse, serial I/O, parallel I/O, disks and plug-in cards. Not to mention the data transactions it handles between the CPU and the PC's peripherals.

## Famous Five

That said, even the best motherboard in the world is useless without its brain - the CPU. Intel and AMD dominate this particular market, leaving users to choose from a variety of motherboards that currently support five main types of CPU interface: Slot A, Socket-370, Slot 1, Slot 2 and Socket-7.

Until the launch of the Athlon CPU in June 1999, AMD had invariably been playing second fiddle to its bigger and usually more reliable opponent. That changed recently when it beat Intel to producing the first 1 GHz (gigahertz), copper-based CPU by a matter of days. Thus, AMD has finally come of age - at least in terms of technology, if not in the number of products sold.

Unfortunately, this new technology inevitably carries a price premium - which means that, for the majority of users, something like the 700 MHz Athlon is likely to remain a good choice for a little while longer.

Meanwhile, Intel's Socket-370 Plastic Pin Grid Array (PPGA) first came to the fore as a cheap alternative to its Slot 1 SECC (Single Edge Cartridge Connector). This Celeron PPGA proved such a hit that around half of Intel's latest PIII CPUs now use the Socket-370 interface. With performance levels only slightly lower than Slot 1 PIII CPUs, the new Socket-370 PIII CPU runs at 100 MHz FSB.

Whether by accident or design, Intel has fashioned a degree of confusion over its range of Pentium III CPUs. There are two amounts of L2 cache to choose from, for example, never mind the various FSB speeds available. Probably the best way to work it out is as follows: expect any Slot 1 PIII 650 MHz or higher to have 256 KB L2 cache, rather than 512 KB; any Slot 1 PIII CPU suffixed with the letter "B", such as the PIII 733EB, will boast a bus speed of 133 MHz, rather than 100 MHz.

Only slightly less confusing, the PIII Xeon CPU requires a Slot 2 interface. Servers, of course, respond well to L2 cache, and the Xeon 550 has up to 2 MB. Unfortunately, its high cost could be an inhibiting factor. On the other hand, the latest Xeon CPUs contain only 256 KB of L2 cache and generally offer better value for money depending on the role of the machine.

At the opposite end of the scale a few manufacturers such as Asus and Gigabyte still offer Socket-7 motherboards, though in fewer numbers than before. Intel, of course, ended production of Socket-7 CPUs some time ago, leaving AMD as the market leader. Apart from reduced acquisition costs the majority of users will gain little from taking the Socket-7 route - despite the recent introduction of AMD's impressive 550 MHz K6-2 CPU.

## Chipsets

One essential and yet often neglected component of any motherboard is the system chipset. However, it is worth remembering that this chipset can make the difference between a good purchase and a bad one. If the CPU is the brain of the PC, the chipset can be regarded as its heart. Efficient data transfers, fast expansion bus support, and advanced power management features are just a few of the things system chipsets are responsible for.

Chipsets come in many forms, some more powerful and comprehensive than others. Choosing the correct chipset not only achieves optimum system performance and reliability, it also ensures the smoothest possible future upgrade path. Between them, the BX, 810, 810E, 820 and 840 chipsets support Intel's current range of CPUs, and all

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but the first two chipsets also support 133 MHz FSB speeds.

Historically, VIA chipsets may not have been quite as trouble-free as their Intel counterparts. On the other hand, the company has usually been able to offer its users exactly what they wanted in terms of features. For example, the MVP3 chipset brought 2 MB L2 cache sizes, the 100 MHz FSB and, in its later stages, Ultra ATA 66 support to the Socket-7 platform even before Pentium III owners could get their hands on an Ultra ATA 66-enabled motherboard.

### Memory

When it transpired a short time ago that Intel's "Camino" chipset, now known as the 820, forced its users to adopt the vastly more expensive Rambus Dynamic Random Access Memory (RDRAM) as their only memory option, the need for a viable alternative became apparent. That alternative grew to be VIA, with its Apollo Pro 133 and 133A chipsets, which supported both PC100 and PC133 mainstream memory types.

Of course, the cost of RDRAM should come down eventually. Even so, it has been noted that RDRAM can actually perform worse than similarly configured systems based on the cheaper and more established Synchronous Dynamic Random Access Memory (SDRAM). Hence, VIA's Apollo Pro 133A solution is an excellent alternative for users that need official support for 133 MHz FSB, Ultra ATA 66 and PC133 memory.

Although Intel's BX chipset is still going strong, the chip itself can be regarded as yesterday's technology. A reliable workhorse it may be, but one that fails to take advantage of several recently introduced specifications, such as faster FSB speeds and Ultra ATA 66. Even so, in terms of performance, there is very little difference between it and Intel's latest chipsets.

Abit's (**www.abit.com.tw**) BP6 motherboard is a good example of what can be achieved with the BX chipset. It provides a dual Socket-370 interface for Symmetric Multi-Processing (SMP) capability under Linux, Windows NT and Windows 2000. Somewhat unusually, it supports four EIDE channels, so there is plenty of room for expansion.

Meanwhile, Intel's 810 chipset is aimed at the low end of the PC market, and the 810E chipset for the mainstream performance market segment. Both chipsets support AC'97, Soft DVD and TV out. The 810 is designed primarily to work with Slot 1 and Socket-370 PIII CPUs running up to 100 MHz FSB, while the latter is flexible enough to support PIII CPUs running up to 133 MHz FSB.

Motherboards fitted with these two chipsets feature on-board graphics controllers that use Direct AGP to create 2D and 3D effects and images. But while embedded features such as these can often seem like a good idea at the time of purchase, they are not necessarily a good choice for everyone, since many of these boards fail to provide an additional AGP slot.

A few manufacturers still produce PCI graphics cards, of course. Plus, many modern plug and play motherboards will disable onboard video if an expansion card is detected. Nevertheless, when a major feature such as the onboard graphics controller goes wrong it could be necessary to replace the whole motherboard, whereas, in the past, adding a new graphics card would have sufficed.

### Future Proofing

Some degree of future proofing is involved with Intel's 820 chipset, since it features support for 133 MHz FSB. But, as we pointed out earlier, most users would find it extremely difficult to justify the premium-priced RDRAM required in motherboards that contain the Rambus Inline Memory Module (RIMM) interface.

True, RDRAM is highly scalable and has a high bandwidth compared to PC100 and PC133 SDRAM. But unless the machine happens to be running applications that need to manipulate large chunks of data in memory, there is little reason to take the RDRAM route until prices drop significantly.

*This article will be continued in a future issue of PCSA.*

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