Any questions?

If you've got a PC problem or think you could help out other readers, contact Frank Leonhardt.

Catching the right bus

I have a question regarding PC bus standards; ISA (8-bit and 16-bit), EISA, VLB, PCI and so on. I am trying to find out which cards can be plugged into which sockets. For example, an 8-bit ISA card can go into a 16-bit ISA slot but where does EISA/VLB fit in? Can an ISA card (8-bit or 16-bit) be used in an EISA or VLB slot? Is PCI compatible with ISA?
Paul Gleeson

In the beginning, there was the IBM PC bus. Actually, that's not true: there were plenty of bus standards before the IBM PC (please don't write in).

The IBM PC had a simple 8-bit bus which could only operate at 4.77MHz. IBM's first 16-bit machine was the AT. This needed a 16-bit bus to go with it, so the AT-bus was devised. Initially operating at 5MHz and later at 8MHz, this extended the original PC-bus by adding a second connector for the extra eight data bits, four address bits, IRQs and DMA channels. The AT-bus, running at 8MHz, is what has become known as the ISA bus. It will accept the old eight-bit cards in the first half of the slot, as long as they operate at 8MHz instead of just 4.77MHz — and they nearly all do.

By the mid-eighties it was obvious that the ISA bus wasn't up to it, so IBM dreamt up the 10MHz, 32-bit MCA bus. This didn't go down very well with the industry because it was totally incompatible with the old ISA cards. And just to make sure it failed, IBM threatened to sue anyone who tried to make an MCA compatible machine without paying them lots of money for the privilege. This was an offer everyone could refuse.

A group of PC manufacturers got together to develop Enhanced ISA (or EISA). Incidentally, this is the point when the AT-bus became known as Industry Standard Architecture (ISA). EISA used a special double connector which would accept both new and old standard cards. Unfortunately, EISA was rather expensive to implement so it only found favour with high-end machines such as file servers.

By the early nineties, the industry was ready to have another go — it needed to because high-performance graphics and multimedia were coming along. VESA (the Video Electronics Standards Association) came up with a standard local-bus connector (VLB) which was added to the end of the ISA slot. A VLB card would plug into the ISA slot and the VLB extension connector at the same time. An ISA card could fit into the slot as well; it just wouldn't mate with the VLB bit. It was cheap and simple and lots of people jumped on the bandwagon.

We'd probably all be using VLB now if it hadn't been for Intel releasing PCI (which is nothing like ISA). Technically it's quite good, but if anyone else had tried to force it on the industry, it would have gone the same way as MCA. Anyway, Intel makes most of the world's Pentium motherboards, if you want a Pentium, you tend to get PCI with it. And of course, Intel makes and sells the chips necessary to implement PCI. But it does have its limitations and these may begin to show during the next year or so. Intel's answer is for a machine to have more than one PCI bus, but VESA has other ideas. The association has come up with the VESA Media Channel (VMC) bus which tackles the problem of high-volume data from multimedia devices from a different angle.

Help with upgrading

Your recent articles in *PCW* about hard disk upgrading have been useful to me as I am considering doing this. But I have a couple of queries.

Firstly, you say that IDE drives over 512Mb need special driver software. Would this still be the case if a drive over 512Mb was divided up into partitions which were all smaller than 512Mb? Would FDISK be able to correctly partition such a disk?

Secondly, am I correct in suspecting that if I buy 16Mb of 30-pin SIMMs for my current 486, I would be unable to transfer them to a new computer in a few years' time because it would only accept the 72-pin SIMMs (which are rapidly becoming the norm)? Or does there exist a device to convert 30-pin to 72-pin SIMMs?
Sebastian Wills
<seb@empyr.dircon.co.uk>

As far as breaking the disk into partitions goes to get more than 516Mb of space — nice try, but no. It is to do with the way the BIOS works, and FDISK goes through the BIOS to access the disk at a low level. The highest physical sector at which a standard BIOS can access is 1024 x 63 x 16 (tracks x sectors/track x heads). With 512 byte sectors, this gives you 516Mb. If you modify the BIOS (by replacing it with special drivers) you can pretend you have 256 heads instead of just 16, which gives you 8Gb to play with. This all works because modern IDE drives translate the physical track/sector/head requests to their own internal address — the BIOS is none the wiser.

You're quite right about the 30-pin SIMMs; I'm not spending a penny more on them myself. If you need more memory, it might be the right time to upgrade your motherboard as well. Some dealers still allow you to trade in 30-pin for 72-pin but this may not be the case by the end of the year. If you are planning to buy RAM which you can transfer to a new machine, make sure it is 72-pin.

Although there is no way to convert 30-pin parts to 72-pin, you can get dual-standard motherboards with sockets for either.

Disk drive conflict

I own a 486DX-50 with an IBM Spitfire SCSI-2 hard disk which is controlled by an Adaptec 1542C SCSI controller. Everything was working out just fine until I decided that I needed to get another hard disk.

You may be wondering why I need another hard disk when I already have 1Gb of storage. The reason is that I have a number of confidential files on my PC which I don't want people to get their hands on. My plan was to get an IDE hard disk and an IDE removable hard disk bracket, so I could save all my work on this and then simply take it out when I

wasn't using my PC. So I managed to obtain an ALPS DR311 105Mb IDE hard disk which I put into my machine — and that's when the problems started.

Basically, I want to have my SCSI hard disk as "C" and my IDE hard disk as "D". The problem is that if I set the AMI BIOS to say that my IDE hard disk is "C", the SCSI BIOS will automatically assign its hard disk to "D". If I set the AMI BIOS to say that the IDE hard disk is "D", the SCSI BIOS automatically assigns its drive to "C" but just sits there when it should be saying "Starting MS-DOS". Please could you help me with this problem as it's driving me mad.
Mike Sewart
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When the PC starts up it assigns letters to disks, or disk partitions, in the order they are found. Because the motherboard BIOS gets the first look-in, it finds its own IDE drive partitions first. Then the BIOS on the SCSI board has a go and adds its drives to those already present (i.e. drive A: and drive C:). There is nothing much you can do about this.

When you set the IDE drive in the BIOS you are actually configuring the physical unit, which should be zero or one. In order to avoid confusing users, these are sometimes called "C:" and "D:" in the BIOS, and assuming that none of the physical disks contained more than one partition, it would probably be true. Unfortunately, for your purposes, it's a red herring.

It is technically possible to re-map the drives once the system has booted but there is quite a high risk that the utility software will become confused by this, and you may end up losing data. Microsoft used to supply a utility called Assign for doing this with DOS, but they have dropped it after version 5.0; it will work with later versions, but use it at your own risk.

Unless any readers have a reliable fix for this one, the obvious solution would be to swap the IDE drive for a SCSI and set its LUN to something below that of the Spitfire.

Faster cards and IDE for EIDE

In the near future, I intend to use my home system for communications. To cut the cost of on-line charges I hope to purchase a V.34 modem; however, I have found that the serial ports on the computer are of the 16450 type and may not be fast enough. Do I need to

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purchase a faster I/O card with the 16550 AFN port, or is there something better?

Additionally installed on the computer is an IDE CD-ROM drive on the same channel as the hard disk, which affects the 32-bit disk access in Windows. I have read about a new Enhanced IDE (EIDE) protocol which enables four IDE devices to be used with two on each channel. If purchased, would the EIDE controller allow the reinstatement of 32-bit disk access? Is it easy to change IDE for EIDE cards and are there problems regarding compatibility?

Finally, my computer has a VL-Bus Super-I/O card. What is the difference between this and a Multi-I/O card?
Stephen Evans
<sre2@coventry.ac.uk>

A 16550 is a better serial communications chip than the 16450 or 8250 because it has a 16-byte internal buffer. This can prevent data loss while the CPU is very busy, as sometimes happens under Windows. Nevertheless, a 486 processor should be able to manage without one under most circumstances. Before you go swapping boards around, it would be a good idea to make sure you actually do have a problem.

The 16550 is pin-compatible with the 8250 or 16450, so if you have one of these chips in your system you can swap them over. However, most machines these days included an 8250 compatible as part of a multi-function chip which cannot be changed.

I'm not exactly sure why your IDE CD-ROM drive is spoiling the Windows disk access. However, there are some problems using EIDE with Windows 3.1 32-bit file and disk access at present: basically, if you try to use the enhanced features of EIDE, then the standard IDE drivers which are part of Windows aren't going to

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work. Hopefully, this will be remedied by Windows 95, but until then you should switch your EIDE BIOS addressing from LBA back to the standard CHS.

As to your final question: the only difference between a Multi-IO card and a Super-IO card is in the name that each manufacturer chooses to call their boards.

The right connections

I have five computers with the following specification: 386DX/2 33MHz processor (128Kb cache), 4Mb RAM (upgradable to 32Mb), 260Mb disk, Windows 3.1 and DOS 6.2. I want to connect them in a LAN — what software and hardware do I need? And do you know of a good book that explains about connecting LANs?
Robin Normanton, Swindon

There are two systems I recommend for people wanting to experiment with LANs: Little Big LAN and Windows for Workgroups. Little Big LAN is remarkable because it is incredibly good value for money. At present the software costs about £79 for the entire network. It also allows you to use any odd network cards or interfaces you have to hand on the same network, including serial and parallel cables. And just because it's cheap, it doesn't mean it's light on features.

If you are more interested in standardisation and want more control over the network, like a client-server system, Windows 3.11 for Workgroups is a good place to start. You'll need to buy a copy of the software for each machine on the network, together with a network adaptor card. If you make sure any cards you buy are NE2000 compatible, you shouldn't have too many problems.

The manuals which come with each of these products give a good grounding in the theory, as well as the practical problems of setting up a LAN. The Windows manual is particularly good for beginners.