Chapter 1

Motherboards and power supply units

[BEGIN INTRO]

The Motherboard – also known as the *System Board* or *Main Board* – is the component which, literally, holds the other components together. Everything in the PC is attached one way or another to the motherboard and every piece of data and every control signal passes over its buses. It also delivers power to attached components. Because of its central role in both the physical construction of the PC and its operations and its relationship to all other components its true to say that if you 'know your way around' a motherboard you are well on your way to understanding the hardware side of the PC.

The power Supply Unit (PSU) supplies power to one or more connectors on the motherboard and has to have a compatible 'form factor'.

[END INTRO]

[BEGIN EXAM OBJECTIVES]

Exam objectives 1.1 (part)

Identify the names, purposes and characteristics of motherboards

- Form Factor (e.g. ATX / BTX, micro ATX / NLX)
- Components
    - Integrated I/Os (e.g. sound, video, USB, serial, IEEE 1394 / firewire, parallel, NIC, modem)
    - Memory slots (e.g. RIMM, DIMM)
    - Processor sockets
    - External cache memory
    - Bus architecture
    - Bus slots (e.g. PCI, AGP, PCIE, AMR, CNR)
    - EIDE / PATA
    - SATA
    - SCSI Technology
- Chipsets
- BIOS / CMOS / Firmware
- Riser card / daughter board

Identify the names, purposes and characteristics of power supplies, for example:

- AC adapter

- ATX
- Proprietary
- Voltage

[END EXAM OBJECTIVES]

Motherboards

Form factors

The physical characteristics – size, fixing points, general layout of components etc. - are defined by its *form factor*. Early PC's were known as 'Advanced Technology' and many components associated with that era designated as *AT* by association. For this reason, the early motherboards were referred to as AT form factor motherboards. They are no longer used for building PC's, but their successors are. The important motherboard form factors for the A+ exams are: ATX, BTX, micro ATX and NLX.

The ATX form factor

This is the motherboard type which you will encounter most frequently when working in the field. The maximum size for an ATX board is specified as 12.0” x 9.6” (305mm x 244mm). This is similar to the size of the earlier AT specification but most of its other characteristics are different. The orientation of the board is rotated by 90 degrees – it fits across the width of a desktop case - and the mounting locations and power connections are different.

[INSERT FIGURE 1.01] labelled figure of ATX board

I/O Ports on an ATX motherboard are in 2 rows at the back of the machine and feature PS/2 connectors for both mouse and keyboard and 2 9-pin serial ports and a parallel (printer) port. There are probably, but not necessarily, other ports for USB, sound, LAN connection, etc.

The ATX mounts RAM and CPU away from the expansion slots and closer to the power supply fan. On earlier motherboards, the power supply fan pulled air into the case over the CPU and memory to improve cooling of these components, but this arrangement has been superseded. In order to reduce dust and dirt from the atmosphere entering the case the ATX form factor uses a fan which pulls air across the components and expels it through the case vents. There is also provision for an additional fan on most ATX motherboards. Use of such a fan is recommended where there are many hot-running components such as multiple hard drives etc.

ATX motherboards were the first to introduce support for *soft switching* options for the power supply, i.e. power can be turned off though software. ATX boards also provide a range of voltages: 12v, 5v and 3.3v through the one-piece 20 pin power supply connector.

All motherboard form factors are associated with the case type and the power supply unit. When buying or upgrading all three elements must match.

The micro ATX form factor

This is a development (or variant) on the standard ATX specification. It is smaller – the maximum size being 9.6” x 9.6” (244 mm x 244 mm). The size reduction is achieved by reducing the number of expansion slots. A full sized ATX, for example, usually has 5 PCI slots, whereas a micro ATX will typically have three. Micro ATX boards often have a lot of I/O ports built into the board – an on-board graphics chip, for example – and for this reason the micro ATX is popular with system builders when producing budget systems. With a few small modifications it is possible to mount a micro ATX motherboard in a full sized ATX case, though the opposite is not possible – a full size ATX board is physically too big to mount in a micro ATX case, even though in terms of fixing points, etc. it would otherwise be compatible. Other components, such as expansion cards and power supplies are compatible with both ATX and micro ATX specifications.

The BTX form factor

Like the earlier ATX specification, the *Balanced Technology Extended* (BTX) specification was devised by Intel. It was first published early in 2005 and one of its principal concerns was to deal more effectively with the seemingly ever increasing heat problems associated with modern multi-media PC's mainly through a better engineered airflow though the case and over the components.

The BTX specification also supports newer technologies such as PCI Express, Serial ATA and USB 2 as part of its original design rather than as additional features grafted on to the earlier specifications.

In terms of size there are a number of options. The depth of the board is always 266.7 mm, but there are four widths described in the specification depending on the number of expansion slots supported.

Table 1.1 BTX motherboard sizes

Board	***Width***	***Max Number of slots***
pico BTX	203.20 mm	1
nano BTX	223.52 mm	2
micro BTX	264.16 mm	4
BTX	325.12 mm	7

The larger boards, unsurprisingly, have more fixing points in order to mount them securely in the case. Full sized BTX boards will work with ATX power supplies because the power connector is the same and the direction of the airflow from the cooling fan in the Power Supply Unit is unchanged. BTX motherboards have not (yet) been widely adopted by system builders

The NLX form factor

There has always been a market for PC's described as 'slimline' or 'small footprint' and these rely on specially designed motherboards. Early PC's of this type were based on a now defunct specification called LPX. The key characteristic of these boards is that rather than fitting expansion cards into slots on the motherboard, the system bus is on a riser card that plugs into the motherboard. Expansion cards are then fitted into the riser card – or daughterboard – parallel to the place of the motherboard.

Just as the original AT motherboard became outmoded and was replaced by the ATX specification, the LPX was replaced by a new specification (from Intel) called New Low Profile Extended (NLX).

[INSERT FIGURE 1.02] Labelled line drawing of NLX motherboard

These motherboards were popular with system builders in the late 1990's – the era of slot processors – but have largely been superseded by newer specifications such as micro ATX (above).

Two new motherboard types (not in the A+ spec)

There a two new motherboard types which may supplant the micro ATX in the future. These are *Flex ATX*, which Intel describe as an 'Addendum' to the micro ATX specification, and *Mini-ITX* from VIA Technologies. Flex-ATX boards have a maximum size of 9.0” x 7.5” (229 mm x 191 mm) and have fixing holes and external ports that make them compatible with ATX and micro ATX cases. Mini-ITX are 6.7” x 6.7” (170 mm x 170 mm) and are intended to deliver low power consumption and quieter performance, particularly for the 'home theater' market.

Components

Integrated Input / Output (I/O) Ports

There has been a trend through time towards building I/O ports on to the motherboard instead of fitting them on expansion cards. Costs of budget systems, where high performance is not needed, can be reduced by using a motherboard which has built in I/O. A workhorse PC that is used for word processing, email and web access can, for example, operate satisfactorily with an on board graphics chip rather than the sort of top of the range graphics cards needed for gaming or three dimensional design work. The commonest integrated I/O ports are: sound, video, USB, serial, IEEE 1394 / Firewire, parallel, network Interface Card (NIC) and modem.

[INSERT FIGURE 1.3] layout of ATX ports.

Sound

Like most on-board I/O ports, the sound ports tend to be adequate rather than outstanding in performance. When higher quality of sound is required, it is possible to install a sound card in one of the expansion slots on the motherboard to replace it. When this is done it is good practice to disable the on-board ports in the system BIOS set up in order to save resources. In some instances, this may be essential for the new sound card to work properly.

Video

On-board video is popular in budget systems and is adequate for relatively undemanding applications. As with sound ports, it is possible to upgrade to a dedicated graphics card to obtain better performance. Disabling the on-board port in the BIOS set up is generally recommended. Most on-board graphics use the Accelerated Graphics Port (AGP) chip and connect to the monitor through the standard VGA port. This is a female connector with fifteen lines. The VGA connector and its alternatives such as DVI are considered in [XREF] Chapters 4 and 5.

Universal Serial Bus (USB)

The Universal Serial Bus (USB) was developed to provide a simple fast general purpose interface between the PC and attached USB devices. Its key characteristic from the user's point of view is that it is 'hot swappable', i.e. it is possible to connect and disconnect installed devices without re-booting the PC. The connector at the PC end of the connection is known as a type 'A' connector. It is flat and rectangular in section. The attached devices use a type 'B' connector which is smaller and almost square in section. USB supports data transmission rates of:

- 12 Mbps for ‘fast’ devices. (this is the original USB 1 specification).
- 1.5 Mbps though a sub-channel for ‘slow’ devices such as keyboards and mice.
- 480 Mbps – introduced with USB 2.0.

USB allows for connection of up to 127 devices through USB hubs and there is even a USB 'bridge' that can be used to connect two PC's back-to-back laplink style for data transfers. USB can provide power to low power devices such as keyboards and mice: power hungry devices such as printers need their own independent power supply. USB is considered further in [XREF] Chapter 5. There is also a web site www.usb.org which is the home of the trade association.

IEEE 1394 / Firewire

IEEE 1394 is the standard defined by the Institute of Electrical and Electronic Engineers – a US based standards organisation - as a rival technology to USB. Firewire is probably the best known implementation of the IEEE 1394 standard and the name is the property of Apple Computer Inc. Other implementations of the standard are: iLink (Sony) and Lynx (Texas Instruments).

The 1394 connector is larger than the one used by USB and it is nearly square in section. The standard cable has 6 lines and – like USB – can be used to provide power to low power devices. IEEE 1394 can support up to 63 attached devices. It is sometimes referred to as 'Serial SCSI'. 1394 is considered further in [XREF] Chapter 5. There is a web site www.1394ta.org (the 'ta' stands for Trade Association) where you can find news of the latest developments in this technology.

Parallel port

The parallel port has been part of every PC since the days of the original 8086 / 8088 systems built by IBM in 1981. Like most sub-systems of the PC it has developed through time, but its appearance – a D-shaped female connector with 25 lines – is largely unchanged. Historically, its main use has been for printing, so it is frequently referred to as a 'printer port' or 'LPT1'. Modern parallel ports are almost invariably on-board and usually support bi-directional data transfers, though this may require you to change settings in the BIOS setup utility. Parallel ports are considered further in [XREF] Chapter 5.

Network port

Until relatively recently, network connectivity was usually through a port which was added as an expansion card in one of the motherboard slots, and this is still frequently the case. However, the growth in the popularity of networking in recent years and the almost universal adoption of Ethernet networking technology has resulted in Ethernet ports being built in to the motherboard. In laptop / portable systems, the RJ45 port for Ethernet networking is almost a universal feature. Most ports support 10/100 Mbps transmission speeds and 1,000 Mbps -Gigabit Ethernet – is becoming increasingly common

Modem

The modem port is similar in appearance to the RJ45 network port, but it is smaller. It is knows as an RJ11 (the 'RJ', stands for 'Registered Jack', by the way) which is widely used in the US telephone system. Internal on-board modems are slower in operation and may not be supported by all operating systems. The main advantage of this type of modem is simplicity of use - all that is required is a cable from PC to the 'Phone line and setting up the connection in the operating system. With the decline in dial-up as a means of connecting to the Internet this type of port is of declining significance.

Memory slots

In the early days of the PC, system memory -RAM – was mounted on the motherboard as individual chips. This approach was rapidly replaced by the practice of mounting the RAM chips on printed circuit boards - Memory Modules - which fitted into slots on the motherboard. There were various systems for doing this, but current practice is dominated by variations of the Dual Inline Memory Module (DIMM).

Dual Inline Memory Modules (DIMM's)

Every motherboard has RAM slots which are compatible with a particular memory type and you can only use memory of the type supported by the motherboard. If the PC you are working on supports only (say) 168 pin DIMM modules (usually associated with a memory type known as SDRAM) then this is all you can fit in that slot. Module types have notches in their bottom edge so that only the right type of memory can be fitted the right way around. Various DIMM types are used for different RAM types. The commonest slot sizes on the motherboards used in desktop machines are:

- 168-pin-DIMM's, usually used for SDRAM
- 184-pin-DIMM's, used for DDR SDRAM
- 240-pin-DIMM's, used for DDR2 SDRAM

Rambus Inline Memory Modules (RIMM's)

This is a proprietary memory type introduced in 1999. The modules are similar in appearance to DIMM's but are not compatible with them. It is more expensive than other memory types and is no longer widely used. You may still come across it in the field on legacy systems, but the cost of upgrading systems that use this type of memory is usually prohibitive.

Memory types and their characteristics are considered in more detail in [XREF] Chapter 3

Processor sockets

Just as a particular motherboard supports a particular type of memory module, with a choice of speed and capacities, it also supports a particular type of CPU chip and a range of chip speeds.

[INSERT FIGURE 1.4] Caption: A Typical ZIF socket.

Figure 1.4 shows a typical processor socket that you might see on a modern motherboard. In order to fit the processor, raise the lever on the side of the socket, drop the processor in place, then lower the lever and clip it into place. This secures the processor. This type of socket is known as a Zero Insertion Force (ZIF) socket. The figure shows a 'generic' socket of this type – based on an Intel Socket 423, which was the early (Willamette core) Pentium 4 processor.

Note, from the figure, the arrangement of the holes which are staggered to save space. The generic term for this is a 'staggered pin grid array' and many processors from both the major manufacturers – Intel and Advanced Micro Devices (AMD) use a variant of it. An alternative approach is to place the pins in the motherboard socket. Instead of pins on the chip it has pads of gold plated copper which make contact with the pins on the motherboard. This arrangement allows higher pin densities and has been adopted by both Intel and AMD for some of their later chips.

CPU chips are discussed in detail in [XREF] Chapter 2.

External cache memory

In general terms – not just chips and memory – a cache is a temporary store of data which, having been accessed once, is stored locally so that it can be accessed again quickly. Hard disks, for example, have cache memory built in to them in order to speed up disk access. CPU chips have small amounts of on-the-die high speed storage built in to them for the same reason. The implementation of cache storage for a CPU chip is also extended to include not just on-the-die storage, but also external storage on-the-board. This is usually implemented as a physical module, plugged in to the board and, whilst it is less efficient than on-the-die cache it can, nevertheless, improve overall performance.

Bus architecture

A bus is a physical channel which carries electrical signals – usually in parallel – across the motherboard. If you pick up a motherboard and examine it, particularly from the under side, you will see the traces of the wires which make up the various physical communications channels.

The most important bus on a motherboard is the Front Side Bus – generally abbreviated to FSB. This is the bi-directional communications channel which links the CPU and the chipset (see chipsets, below). Its speed is critical to the speed of the other components and buses on the board. A CPU, for example, will operate at a multiple of the FSB speed. Given a FSB of 133 MHz and a multiplier of 12.5, we would have a CPU speed of 1663 Mhz.

In older systems, peripheral buses such as PCI and AGP ran at a fraction of the FSB speed by using a fractional multiplier. However, in modern practice, these buses may operate independently of the FSB.

Bus slots

Since the introduction of the original IBM PC - released on August 12th 1981 – it has always been an extensible system which allows additional components to be added through a variety of expansion slots. The general principle is that a bus conducts, signals, power, and data across the motherboard, and an added component can access the bus simply by plugging in to it.

PCI

The Peripheral Component Interconnect (PCI) standard specifies a bus which allows for the connection of devices to it. The specification details the connections for on-board I/O devices of the type which we looked at earlier as well as providing the interface for PCI expansion cards. The PCI slots shown in Figure 1.1 are the standard 32 bit slot. There is also a 64 bit variant which is physically longer. The original standard specified a 33 MHz signalling – this was doubled to 66 MHz in a later standard. PCI slots are almost invariably cream / off-white in colour and there are usually three to six of them on the motherboard according to the motherboard type. PCI and other expansion cards are considered in detail in [XREF] Chapter 5

AGP

Accelerated Graphics Port (AGP) was introduced in 1997 to provide a faster graphics interface than that delivered by PCI graphics cards. The original specification was for 66 MHz – compared with PCI's basic 33 MHz – and this has been increased several times in subsequent revisions of the standard. The AGP slot can be identified by it colour – it is nearly always brown – and the fact that it is offset from the PCI slots on the board. Unlike PCI slots, there is usually (nearly always) only one AGP slot on the board. There is more about AGP in [XREF] Chapter 5

PCI-E

PCI Express is a new standard which seems set to replace the older PCI expansion slots and cards. It has already replaced AGP for graphics cards on modern systems and a new version is scheduled for release in 2007.

[INSERT FIGURE 1.5] Line drawing of PCI & PCI-E slots

Figure 1.5 shows standard PCI slots and two different PCI-E slots. Cards which fit in the smaller (single speed) slot can be fitted in the 16 speed slot but will only function as single speed cards. There is more about PCI-X in [XREF] Chapter 5.

(Note: do not confuse PCI-E with PCI-X. PCI-Extended (PCI-X) is a revision of the PCI standard which gives a higher performance rate than standard PCI, but is has not been widely adopted and appears to have been largely superseded by PCI-E.)

AMR

The Audio Modem Riser (AMR) slot is found on older motherboards – typically from the era of Pentium III and Pentium 4 chips. It was used as an interface for analogue sound and modems. It was superseded by the Communications Network Rise (CNR) – below, which has, in turn, been more or less superseded by on-board components.

The AMR slot is usually brown and is smaller than the standard PCI slot.

[INSERT FIGURE 1.6] Line drawing of AMR & PCI slots

CNR

The Communications and Networking Riser (CNR) slot was a replacement for the AMR slot, found mainly on some Pentium 4 class motherboards. It is usually brown in colour and similar in appearance to the AMR slot. It supports audio, networking and modem functionality, but has largely been superseded by on-board components.

EIDE / PATA

Until relatively recently these were the standard hard disk types on nearly all desktop PC's. Enhanced Integrated Drive Electronics (EIDE) was the first hard drive type to integrate the control electronics on to the drive itself – earlier drives needed a separate expansion card – hence the *Integrated* in the name.

Later developments of the standard were called Advanced Technology Attachment (ATA). AT Attached Packet Interface (ATAPI) is the variant used to indicate CDROM's and tape drives. Other disk types such as the various specifications for Ultra Direct Memory Addressing (UDMA) use the same motherboard slots. With the advent of Serial ATA (SATA) from around 2003 ATA – which is a parallel technology – was re-named *Parallel* ATA (PATA) to distinguish it from the newer serial ATA technology.

Although there have been several generations of improvements in EIDE / PATA technology, the basic appearance of the motherboard slots is essentially the same. The motherboard connectors -like the drives themselves – have 40 pins and newer drives and cables are backward compatible with the older types. High speed connectors – the type which you will find on most modern motherboards - are usually distinguished by being blue in colour to correspond with the colour coding of the 80 line / 40 pin connections used on later PATA drives. Hard disk drives are considered further in [XREF] Chapter 3 and cable types are discussed in [XREF] Chapter 5.

Serial ATA (SATA)

Serial ATA disks are essentially similar to their PATA counterparts, though they achieve faster data transfers though the use of serial communications. The data cable of a SATA drive has seven lines and the motherboard connectors have seven pins. The first version of the SATA standard delivered data transfers of 1.5 Gbps and this was increased in to 3 Gbps in the next version of the standard. Higher speeds are planned. As with PATA, cable and connectors are designed to give backward compatibility between later specification drives and earlier cable and connectors. Figure 1.7 shows a pair of SATA connectors on a motherboard and a SATA data cable.

[INSERT FIGURE 1.7] Line drawing of SATA connectors and cables

Modern motherboards will frequently have both PATA and SATA sockets on them and it is possible, in principle at least, to use both technologies side by side.

Small Computer Systems Interface (SCSI)

Invariably pronounced as *Scuzzy,* the SCSI interface has been in use in various forms since before its formal definition by the American National Standards Institute

(ANSI) in 1986. It has never been widely used on desktop PC's because, although it is considerably more efficient than EIDE / ATA it is also considerably more expensive. Although you may see SCSI connectors on a motherboard, it is more commonly implemented through an expansion card and is more commonly found in server machines. Most server machines use SCSI disk sub-systems because of their speed and reliability. It is usually the technology of choice for implementing fault tolerant disk systems using a Redundant Array of Independent Disks (RAID). Surprisingly, perhaps, there are no officially defined standards for SCSI connectors.

Chipsets

The chipset is the name given to the group of chips which make a motherboard work and although they are critical to the motherboard, they are not necessarily manufactured by the motherboard manufacturer. VIA Technologies, for example, make chipsets that are used by various motherboard manufacturers. Intel – inventors of the microchip in the first place – make both chipsets and motherboards.

Two of the most important elements of the chipset are the *Northbridge* and *Southbridge* chips. The Northbridge chip mediates directly between the CPU chip and high speed components such as system RAM and AGP graphics. Slower components are controlled through the Southbridge which communicates with the CPU via the Northbridge chip.

The chipset of a motherboard – the Northbridge chip in particular – determines the range of CPU's, RAM, etc. that can be used with it.

BIOS / CMOS / Firmware

BIOS

The Basic Input Output System (BIOS) is implemented on a BIOS chip. This chip contains executable code – programs – which are needed to initialize the system at boot time. When the PC is powered up, the programs on the BIOS chip run routines such as the Power On Self Test (POST) which checks things like the amount of installed memory on the system. The BIOS programs have default values that they will use unless they are modified in some way. Such modifications to default behaviour are controlled by CMOS.

CMOS

Complementary Metal Oxide Semiconductor (CMOS) is a type of non-volatile memory which is used to store system settings. The CMOS is 'kept alive' by a small replaceable battery on the motherboard. Settings such as the order in which the PC examines its attached disks, for example, can be set by entering the set-up utility. This is usually accessed by holding down a particular key (the Delete key is frequently used for this) and changing the settings.

[INSERT FIGURE 1.8] Screen shot of Phoenix BIOS screen

Figure 1.8 shows the boot order of a system with a Phoenix BIOS. Other BIOS manufacturers will offer the same functionality, though the user interface may be very different. If for any reason, you cannot access the setup utility, then as a last resort, settings can generally be taken back to factory defaults through changing a jumper on the motherboard – the position of the jumper should be documented in the motherboard manual. As a rough and ready alternative you can also remove the CMOS battery for a while so that the BIOS reverts to its default settings.

Firmware

Early BIOS chips had their programs burnt on to them permanently. This meant that if a bug was discovered or an upgrade was released then the chip had to be replaced. There were a number of developments designed to work around this limitation and the current generation of BIOS chips uses Electronically Erasable Programmable Read Only Memory (EEPROM). This technology means that a BIOS chip can be reprogrammed without removing it from the system by doing a 'flash upgrade'. This consists of flashing new programs on the BIOS chip which will modify its behaviour. Since the programs installed by this method are software embedded in hardware the term 'firmware' was coined to describe it.

Power supplies

As noted earlier in the chapter, the power Supply Unit (PSU) must be compatible with the motherboard type, thus an ATX board will have an ATX power connector and will require an ATX power supply. There are, of course, proprietary PSU's to match proprietary motherboards and cases.

Whatever the details of a particular PSU may be – form factor, price, etc. - its fundamental tasks are the same:

- Conversion of mains Alternating Current (AC) to Direct Current (DC).
- Reducing the mains voltage from 110 volts (USA) or 230 volts (UK).
- Supplying power to the motherboard through a connector – 20 lines in the case of an ATX PSU / board combination.
- Distributing AC power to various components on lines which are rated at 12 volts, 5 volts or 3.3 volts.

The output of a PSU is rated in Watts and most desktop PC's will have a PSU rated at 400 Watts or more, though high end machines may need more than this.

Power Supplies for desktop machines are, of course, internal. Most laptop / portable machines (which are the subject of [XREF] Chapter 12) use an external power supply. This delivers the same functionality as a standard desktop unit, but the voltage reduction and AC/ DV conversions are done within the external unit and the reduced voltage DC power is supplied to the portable PC. This is often by way of a proprietary connector. The advantages of external PSU's of this type is space saving and heat reduction, both of which are major considerations when designing and building a laptop system.

Summary

This chapter has examined motherboards and their characteristics. For exam purposes – not to mention doing the job in field or workshop - you should be able to identify a motherboard by sight or by description. You should be familiar with the various on-board ports and how to replace or upgrade them. You should also be able to identify by sight and know the characteristics of the various expansion slots and the buses to which they are connected.

We have looked at the nature and role of BIOS and CMOS and how this can be related to the installation and configuration of a motherboard. We have also looked at the characteristics of Power Supply Units (PSU's).

Questions

1. You are looking at a motherboard. It has four PCI slots, an AGP slot and a row of ports along the back which includes a pair of connectors which you identity as connectors for keyboard and mouse. Is this motherboard:

A) An NLX.

B) An ATX

C) A Micro ATX

D) None of the above.

2. You are looking at an ATX motherboard. It has a single 40 pin connector which is blue and a pair of 7 pin connectors. What hard disk types does this motherboard support:

A) EIDE / PATA

B}SATA

C) SCSI

D) All of the above

3. You suspect that a PC has a failing power supply unit and you decide to check the output of the unit with a multimeter by probing the lines on the connector to the motherboard. Which reading would you NOT expect to see:

A) 12 volts

B) 15 volts

C) 3.3 volts

D) 5 volts

Answers / explanations

1. You are looking at a motherboard. It has four PCI slots, an AGP slot and a row of ports along the back which includes a pair of connectors which you identity as connectors for keyboard and mouse. Is this motherboard:

B) An ATX

Neither an NLX nor a micro ATX would have that many slots and in any case, the NLX is not part of the A+ specification – it is a forerunner of the LPX form factor, which is.

2. You are looking at an ATX motherboard. It has a single 40 pin connector which is blue and a pair of 7 pin connectors. What hard disk types does this motherboard support:

A) EIDE / PATA

B}SATA

The blue 40 pin connector would support both the original EIDE drive and the later PATA standard. The 7 pin connectors are for Serial ATA. SCSI could be supported, but only by fitting a SCSI adapter card in one of the expansion slots.

3. You suspect that a PC has a failing power supply unit and you decide to check the output of the unit with a multimeter by probing the lines on the connector to the motherboard. Which reading would you NOT expect to see:

B) 15 volts

There is no 15 volt line on a standard PC power supply.

More questions are available from www.aplusforstudents.co.uk

[END]