The first part of this section looks at the main components of the computer -- the power supply, the CPU, memory, storage systems and some peripheral devices. The aim is to ensure that you have a basic understanding of how the computer works and the meaning of some of the jargon associated with it. While it is possible to operate a computer without any understanding of how it works, things make more sense when you have some knowledge of the computer’s operation.
Introduction

When you open up a computer, you see a number of main components - the power supply, the main circuit board that is called the *mother board*, hard and floppy disc drives, and a fan (see figure 5). Depending upon the type of the computer, you may also see a set of slots into which other circuit boards, called *daughter boards* or cards, can be attached. These cards normally allow other devices to be connected to the computer. Computers that have slots are said to have an *open architecture* as they allow the basic computer to be expanded (Note: iMacs do not have floppy disc drives or fans - to me, the absence of a fan is great as I get fed up with the noise that computers make).

Power Supply

The power supply of the computer is very important. The electronic components in a computer require a well-controlled voltage and it is the function of the power supply to deliver this. One thing to note about the power supply is that it generates magnetic fields and so floppy discs should not be placed near it as they may be damaged.
Fluctuations in voltage can be disastrous for a computer. A computer should not be connected to the same electrical circuit as a device such as a fridge or electric heater that uses a thermostat. If this is done, each time the device turns itself on or off, there will be a fluctuation in the voltage that can affect a computer. A colleague had a considerable problem with his computer bombing. When it was suggested to him that he checks to see whether the computer was on the same circuit as his fan heater, all his problems vanished. If a computer is to be placed on an electrical circuit on which there are surges of voltage, it is worthwhile purchasing a surge protection device.

Another source of surges of power in electrical circuits is thunderstorm activity. A lightening strike near your computer can do it a considerable amount of damage. A few years ago, fifty terminals were in use in the University’s Administration building when there was a lightning strike close by. Fifty terminals were made in-operable! When a storm comes close, switch off your computer, and, if practicable, disconnect it from the power supply. Also, disconnect your modem from the phone line, as not doing so can be disastrous!

**Static Electricity**

Another source of potential harm to computer components is static electricity. As little as forty volts can damage some of the newer chips. If you walk over a nylon carpet and sit in a plastic chair, you can generate thousands of volts of static electricity. If you then touch a chip, you can cause it a considerable amount of damage. Should you damage a chip in this way, it is preferable to completely destroy it, as the alternative is to wound it. When this is done, only part of the chip’s circuitry is damaged and the fault will not be discovered until the computer attempts to access that part of the chip. This results in an intermittent fault and these are the most difficult to trace.

The solution to the problem of static electricity is to not handle any of the computer’s internal components unnecessarily. If you do have to delve into a computer’s interior, you should first ensure that you discharge any static that you have on your body. There are two ways of doing this. The first is to touch a large metal object such as a filing cabinet or water pipe immediately before touching electronic components. The second way, which does not look as strange, is to leave the computer plugged in (but switched off at the power point). If this is done, the power supply will be earthed and you can simply touch its case to discharge yourself. Electronic components that you purchase are normally supplied in a grey transparent bag. These are electrostatic proof and components should be kept in them when not in use.

**The Motherboard**
The motherboard contains the Central Processing Unit, main memory (RAM), ROM chips (which hold operating instructions), slots and various connections. If you look at such a circuit board, you will see connections on it through which data is transported. This system is referred to as a bus (the plural of this is busses).

Figure 7: A chip connected to the bus.

Integrated Circuits

Figure 8: An integrated Circuit and with part of its casing removed - the circuit is outlined

The Central Processing Unit (CPU) in a microcomputer is housed on a single Integrated Circuit called a Microprocessor (the definition of a PC is that it uses a microprocessor). An Integrated Circuit is composed of a small wafer of silicon on which several layers of circuits are etched. Where these circuits cross over each other transistor equivalents are produced. A modern Integrated Circuit can have many millions of transistors.

The silicon wafer is placed in a comparatively large plastic case (see figure 8). This case provides protection, removes heat from the circuit, and provides a large enough area for all the required connections to be made. Figure 8 shows
an Integrated Circuit which has had part of the case removed and the actual chip itself has been outlined.

The circuit is shown in more detail in Figure 9, which is a photograph of a special integrated circuit that exposes the actual circuit.

![Figure 9: The circuit in an Integrated Circuit](image)

While it is convenient that modern electronic devices are very small, their size is governed more by necessity than convenience. They are semi-conductors, which means that electrons flow comparatively slowly through them, as opposed to moving rapidly through conductors. For a semi-conductor to work at high speed it is, therefore, essential that all the component parts are as close together as possible so that the electrons have the least distance to cover. Apparently, the limiting factor to making very high speed semi-conductors is a mechanical one rather than electronic; engineers are working on circuits that are so small that the natural vibration of all objects is interfering with their work.