

Chapter 4. Intro to the Motherboard

Now let's dive into the pc box. The whole computer is built up around a *motherboard*, and it is the most important component in the PC.

In this chapter I will introduce the motherboard and it's components.

- Construction of the motherboard.
- The CPU.
- The busses.
- Chipsets (controllers).

I will work through the individual components in more detail later in the guide. This chapter will describe the architecture in "broader" brush strokes.

Data exchange in the motherboard

The motherboard is a large printed circuit board, which has lots of chips, connectors and other electronics mounted on it. Computer nerds simply call it a *board*.

Inside the PC, data is constantly being exchanged between or via the various *devices* shown in Fig. 17. Most of the data exchange takes place on the motherboard itself, where all the components are connected to each other:

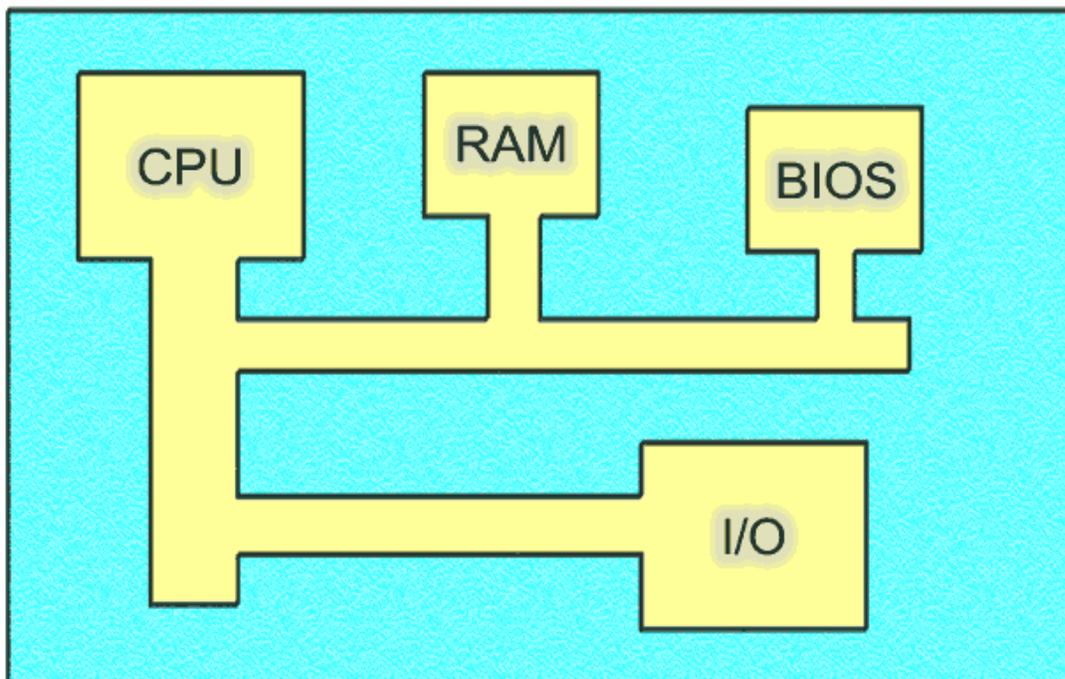


Fig. 23. Data exchange on the motherboard.

Chapter 4. Intro to the Motherboard

In relation to the PC's *external* devices, the motherboard functions like a central railway station.

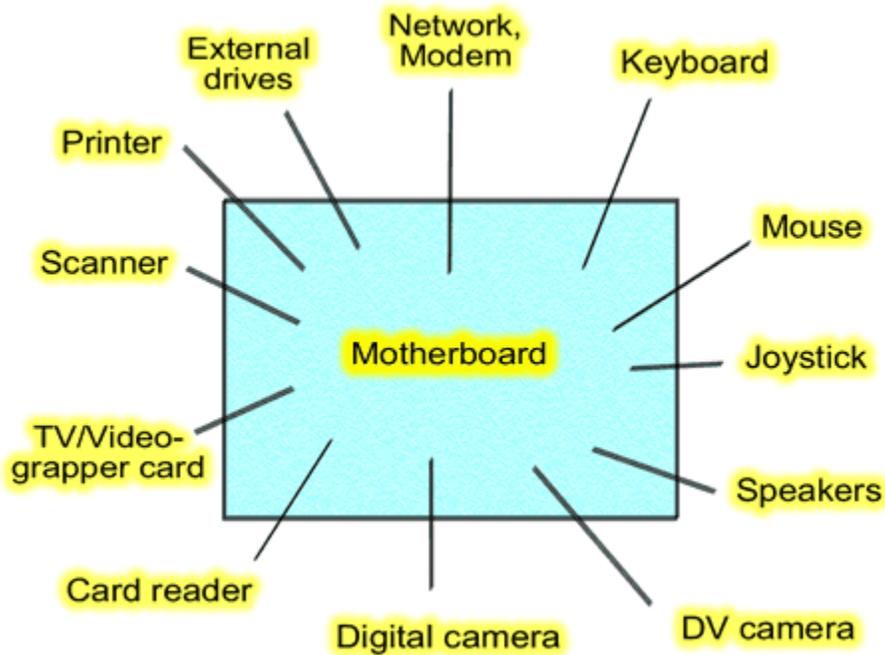


Fig. 24. The motherboard is the hub of all data exchange.

All traffic originates from or ends up in the motherboard; which is appropriately called the most important component of the PC. I will show you pictures of the individual components of the motherboard later, but this is what it looks like as a total unit:

Chapter 4. Intro to the Motherboard

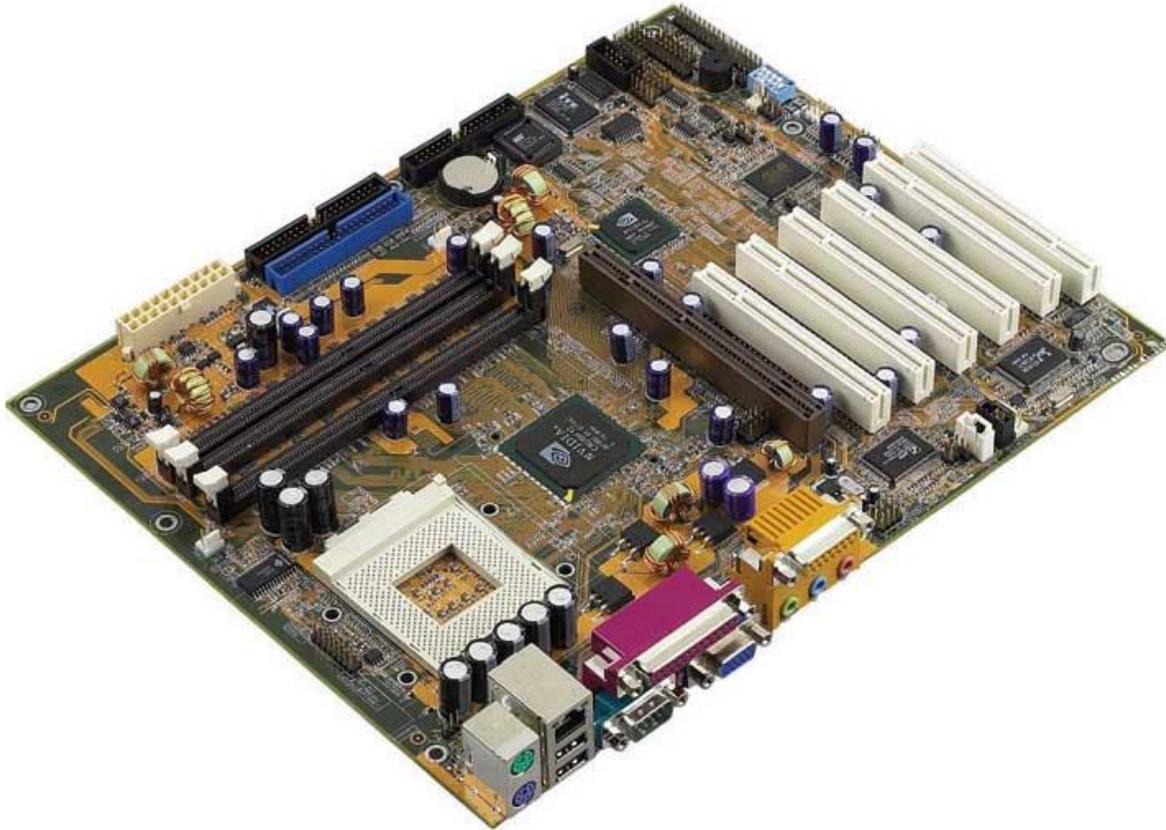


Fig. 25. A motherboard is a board covered with electronics.

Find your motherboard

If you are in position to look at a motherboard, I would recommend you do so. It is a very good exercise to try to identify the various components on a motherboard.

The motherboard is really just a big plastic sheet which is full of electrical conductors. The conductors (also called tracks) run across and down, and in several layers, in order to connect all the individual components, and transfer data between them.

The motherboard is mounted in the PC box using small plastic brackets and screws. The cabinet and the motherboard are made to suit each other, so there are holes in the metal for the connectors mounted on the board. Finally, the motherboard has to be connected to the PC's power supply installed in the cabinet. This is done using a standard connector:

Chapter 4. Intro to the Motherboard

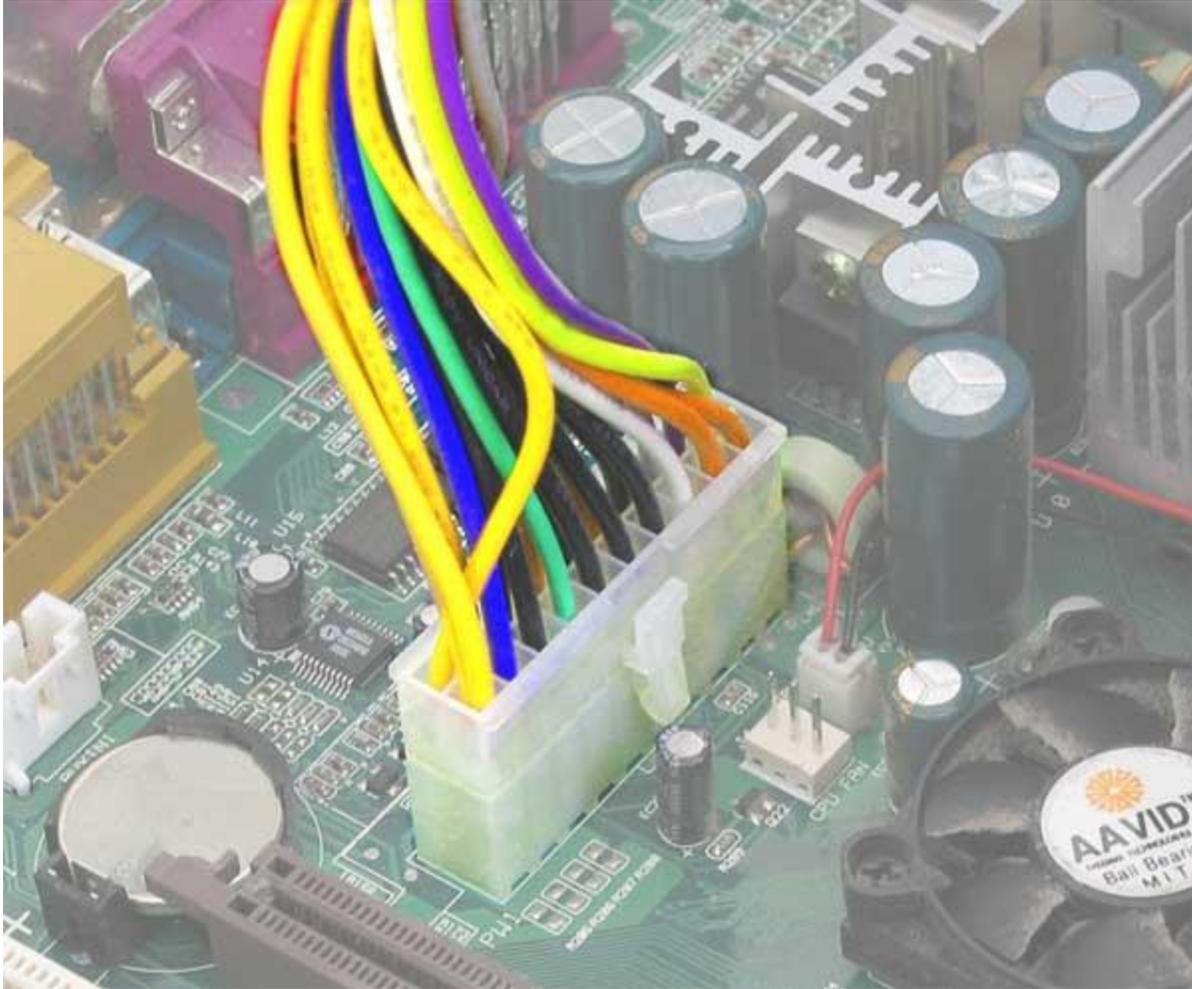


Fig. 26. The power supply is connected to the motherboard via a multicoloured cable and a large white plastic connector.

Now we'll look at the various types of components on the motherboard.

Chips

The active devices on the motherboard are gathered together in *chips*. These are tiny electronic circuits which are crammed with transistors. The chips have various functions. For example, there are:

- ROM chips, which store the BIOS and other *programs*.
- CMOS storage, which contains user-defined data used by the setup program.
- The chipset, which normally consists of two, so-called *controllers*, which incorporate a number of very essential functions.

You'll learn a lot about these chips and their functions later in the guide.

Sockets

Chapter 4. Intro to the Motherboard

You will also find *sockets* on the motherboard. These are holders, which have been soldered to the motherboard. The sockets are built to exactly match a card or a chip.

This is how a number of components are directly connected to the motherboard. For example, there are sockets (*slots*) to mount:

- The CPU and working storage (the RAM modules).
- Expansion cards, also called adapters (PCI, AGP and AMR slots, etc.).

The idea of a socket is, that you can install a component directly on the motherboard without needing special tools. The component has to be pushed carefully and firmly into the socket, and will then hopefully stay there.

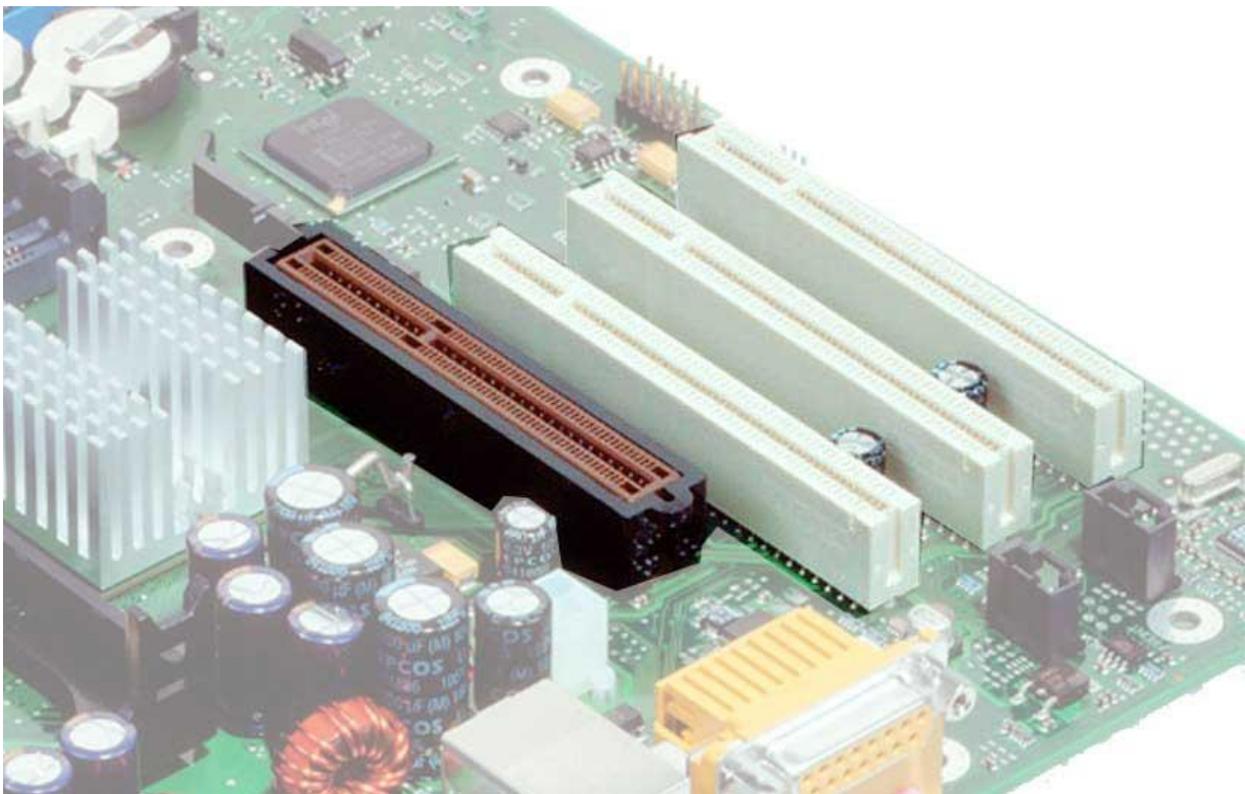


Fig. 27. Here you can see three (white) PCI sockets, in which plug-in cards can be installed.

Plugs, connectors and ports...

The motherboard also contains a number of inputs and outputs, to which various equipment can be connected. Most ports (also called I/O ports) can be seen where they end in a connector at the back of the PC. These are:

- Ports for the keyboard and mouse.
- Serial ports, the parallel port, and USB ports.
- Sockets for speakers/microphone etc.

Chapter 4. Intro to the Motherboard

Often, the various connectors are soldered onto the motherboard, so that the external components, like the keyboard, mouse, printer, speakers, etc., can be connected directly to the motherboard.

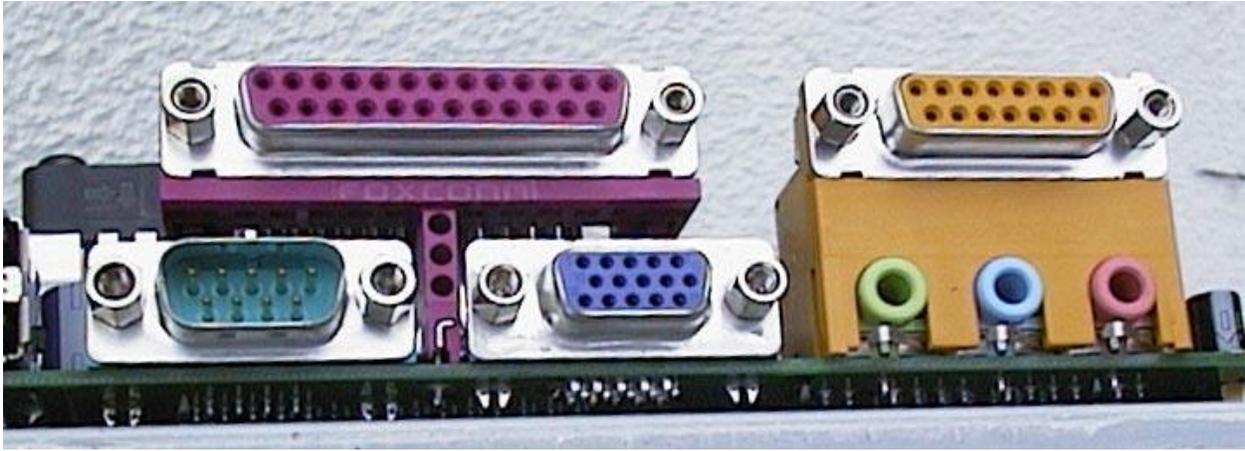


Fig. 28. Connectors mounted directly on a motherboard.

In addition to these sockets, connectors and ports, the motherboard contains a number of other contacts. These include:

- The big *connector* which supplies the motherboard with power from the power supply (see Fig. 26).
- Other connectors for the diskette drive, hard disk, CD-ROM drive, etc.
- So-called *jumpers*, which are used on some motherboards to configure voltage and various operating speeds, etc.
- A number of pins used to connect the reset button, LED for hard disk activity, built-in speaker, etc.

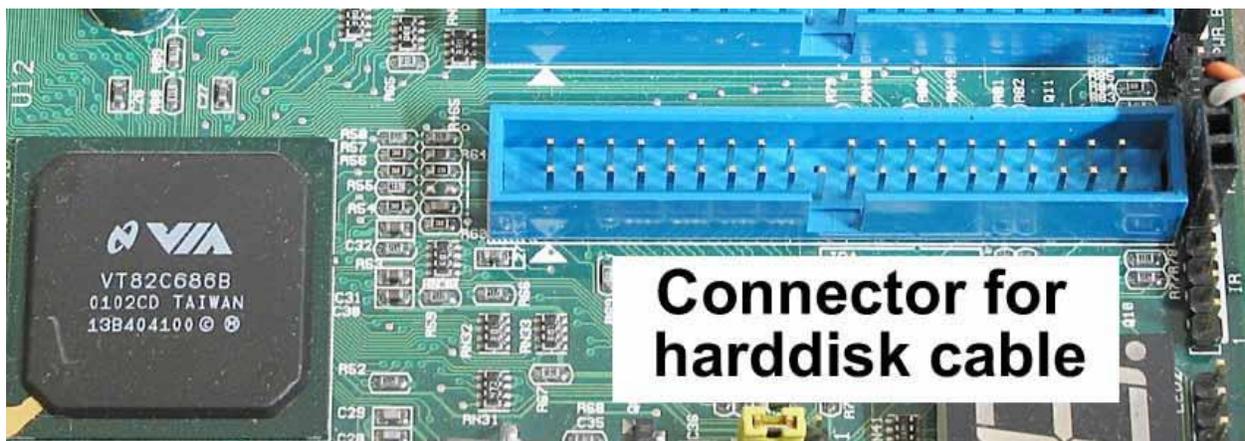


Fig. 29. A connector can be an array of pins like this, which suits a special cable.

Chapter 4. Intro to the Motherboard

Take a look at Fig. 30 and Fig. 31, which show connectors and jumpers from two different motherboards.

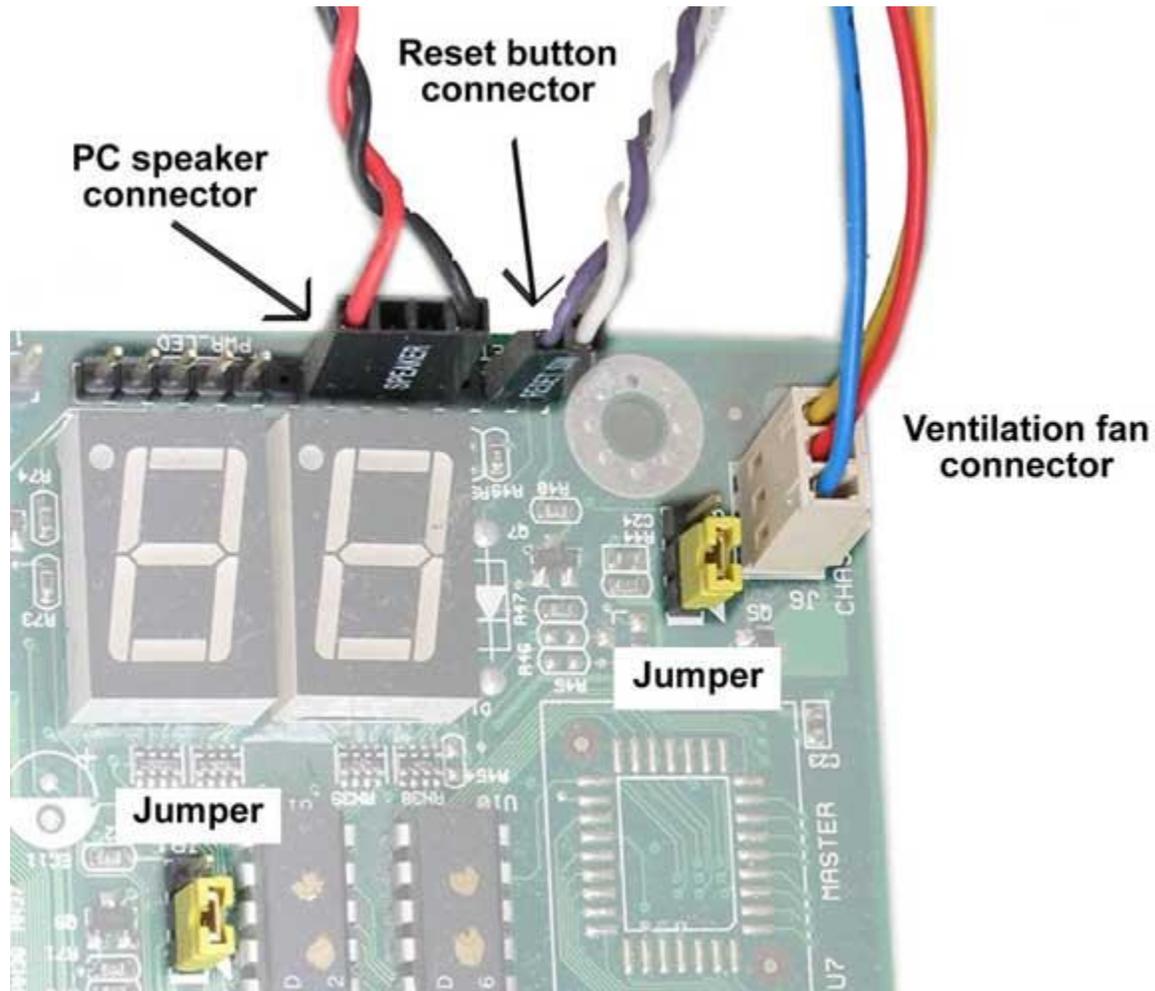


Fig. 30. The tiny connectors and jumpers that are hidden on any motherboard.

The ROM BIOS chip (Award brand), in Fig. 31, contains a small collection of programs (software) which are permanently stored on the motherboard, and which are used, for example, when the PC starts up:

Chapter 4. Intro to the Motherboard

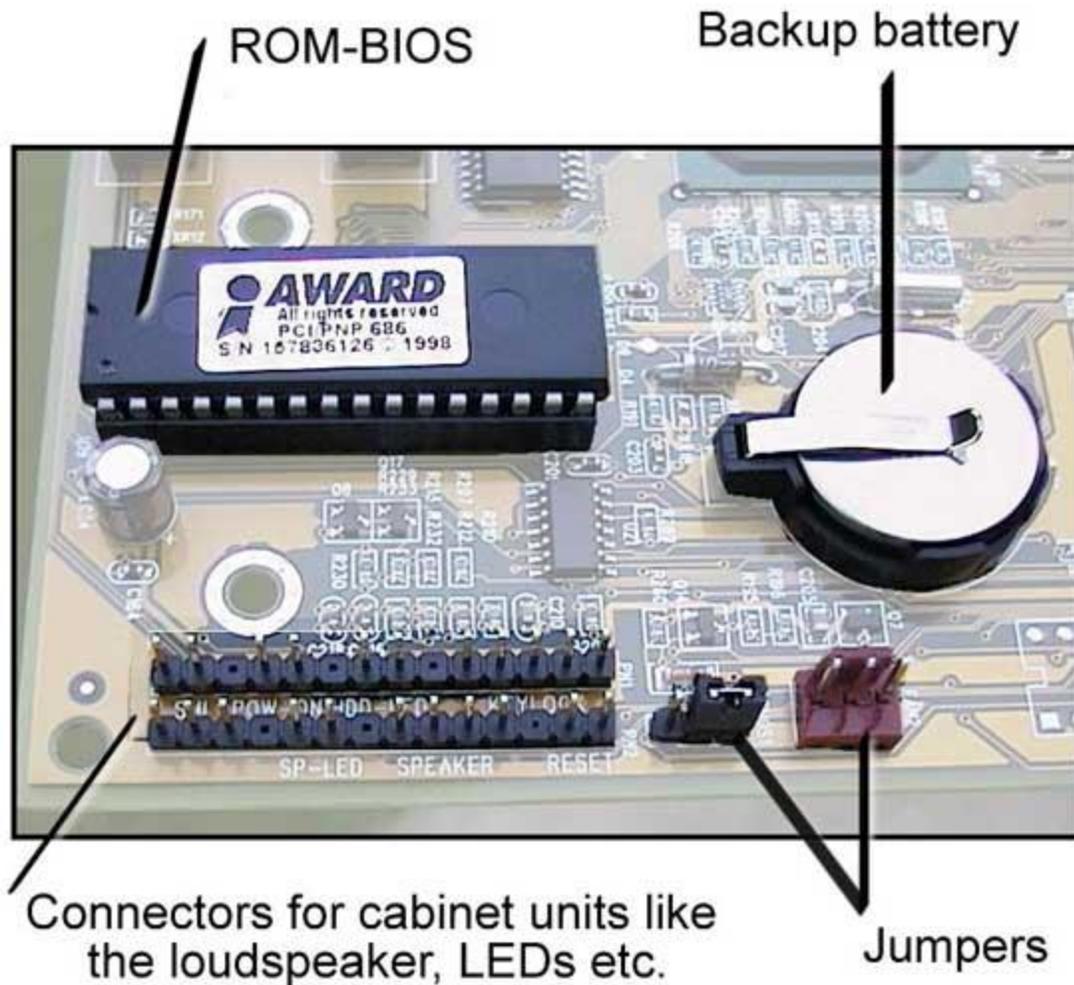


Fig. 31. At the bottom left, you can see the two rows of pins which connect, for example, to the little speaker inside the cabinet. On the bottom right you can see two “jumpers”.

The round thing in Fig. 31 is the motherboard battery, which maintains the clock function and any settings saved in the CMOS storage.

In a later chapter I will describe the motherboard seen through the eyes of a PC builder. But first we shall take a look at the motherboard’s architecture and the central components found on it.