

# Read-only memory (ROM)

## Read-only memory (ROM)

---

There is a type of memory that stores data without electrical current; it is the **ROM** (*Read Only Memory*) or is sometimes called *non-volatile memory* as it is not erased when the system is switched off.

This type of memory lets you stored the data needed to start up the computer. Indeed, this information cannot be stored on the hard disk since the disk parameters (vital for its initialization) are part of these data which are essential for booting. Different *ROM*-type memories contain these essential start-up data, i.e.:

- The **BIOS** is a programme for controlling the system's main input-output interfaces, hence the name *BIOS ROM* which is sometimes given to the read-only memory chip of the mother board which hosts it.
- The **bootstrap loader**: a programme for loading (random access) memory into the operating system and launching it. This generally seeks the operating system on the floppy drive then on the hard disk, which allows the operating system to be launched from a system floppy disk in the event of malfunction of the system installed on the hard disk.
- The **CMOS Setup** is the screen displayed when the computer starts up and which is used to amend the system parameters (often wrongly referred to as *BIOS*).
- The **Power-On Self Test (POST)**, a programme that runs automatically when the system is booted, thus allowing the system to be tested (this is why the system "counts" the RAM at start-up).

Given that ROM are much slower than RAM memories (access time for a ROM is around 150 ns whereas for SDRAM it is around 10 ns), the instructions given in the ROM are sometimes copied to the RAM at start-up; this is known as *shadowing*, though is usually referred to as *shadow memory*).

## Types of ROM

---

ROM memories have gradually evolved from *fixed read-only memories* to memories than can be programmed and then re-programmed.

## ROM

---

The first ROMs were made using a procedure that directly writes the binary data in a silicon plate using a mask. This procedure is now obsolete.

## PROM

---

**PROM** (*Programmable Read Only Memory*) memories were developed at the end of the 70s by a company called *Texas Instruments*. These memories are chips comprising thousands of fuses (or diodes) that can be "burnt" using a device called a "*ROM programmer*", applying high voltage (12V) to the memory boxes to be marked. The fuses thus burnt correspond to 0 and the others to 1.

## EPROM

---

**EPROM** (*Erasable Programmable Read Only Memory*) memories are PROMs that can be deleted. These chips have a glass panel that lets ultra-violet rays through. When the chip is subjected to ultra-violet rays with a certain wavelength, the fuses are reconstituted, meaning that all the memory bits return to 1. This is why this type of PROM is called *erasable*.

## EEPROM

---

**EEPROM** (*Electrically Erasable Read Only Memory*) memories are also erasable PROMs, but unlike EPROMs, they can be erased by a simple electric current, meaning that they can be erased even when they are in position in the computer.

There is a variant of these memories known as **flash memories** (also *Flash ROM* or *Flash EPROM*). Unlike the classic EEPROMs that use 2 to 3 transistors for each bit to be memorised, the EPROM Flash uses only one transistor. Moreover, the EEPROM may be written and read word by word, while the Flash can be erased only in pages (the size of the pages decreases constantly).

Lastly, the Flash memory is denser, meaning that chips containing several hundred mega octets can be produced. EEPROMs are thus used preferably to memorise configuration data and the Flash memory is used for programmable code (IT programmes).

The action involving reprogramming of an EEPROM is known as flashing.