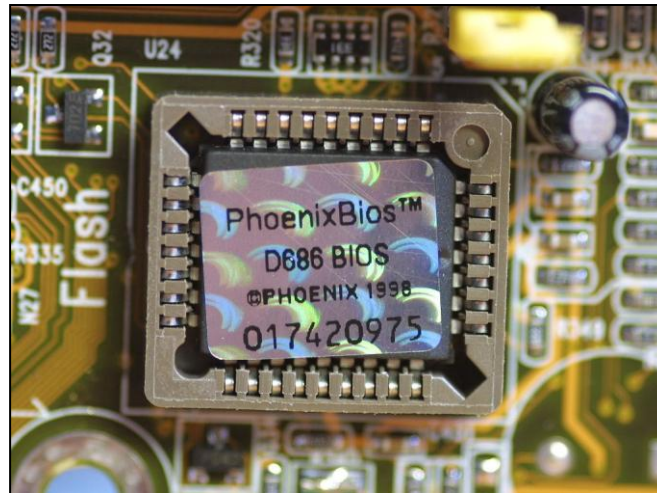


Entering CMOS during boot up

2.1 BIOS

The Basic Input/Output System (BIOS) firmware chip holds a set of instructions that when executed, start the computer. Firmware is non-volatile memory chip that stores data even when the computer is turned off. The contents in BIOS determine computer's startup process. The entire startup procedure is referred to as the boot, or boot-up process.



BIOS firmware from Phoenix Technologies

When a computer is first powered on, the instructions stored in the BIOS chip take the computer through a series of startup steps.

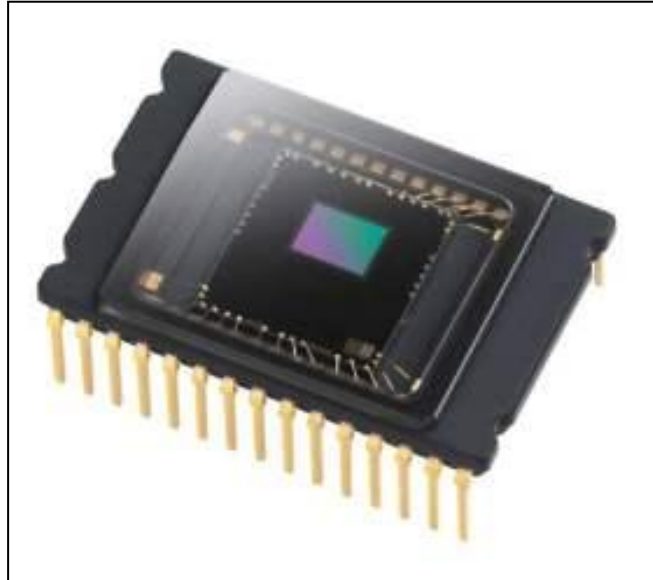
1. BIOS checks the CMOS chip for custom settings (see CMOS below). BIOS uses this information found in CMOS to modify its default pre-programmed startup instructions.
2. Next, hardware device drivers are loaded. Device drivers allow the computer to communicate with hardware devices such as the keyboard and mouse.
3. In this step the BIOS initializes the computer's RAM and power management system.
4. Next, BIOS starts runs a series of diagnostics tests that are known as the Power-On Self-Test (POST) to make sure all of the hardware components are working correctly; see below for more details.
5. BIOS then displays system settings such as the date, time and the amount of RAM that is installed in the computer.
6. After BIOS has completed these steps, it looks for the computer's operating system, i.e. Windows XP, Vista or System 7. To start the computer's operating system BIOS looks for the initial boot program. The initial boot program is stored in the Master Boot Record (MBR) which is always located at cylinder 0, head 0, and sector 1, on the hard disk. The MBR contains instructions and information on how to continue the boot process, and how to load the operating system.

Note:

BIOS is stored in memory known as firmware. It takes more time to access information stored in firmware than RAM. To speed up BIOS some computers copy the contents stored in BIOS to the computer's RAM. BIOS that is copied and read from RAM is known as **shadow BIOS**.

2.2 CMOS

Complementary Metal Oxide Semiconductor (CMOS) is a small chip that holds information about the computer's hardware components and its startup procedures. When a computer is first turned on, BIOS looks for custom settings that are stored in the computer's CMOS chip. For example, if a computer has two hard drives, information in the CMOS will tell the computer which hard drive to use to start the computer.



CMOS Chip

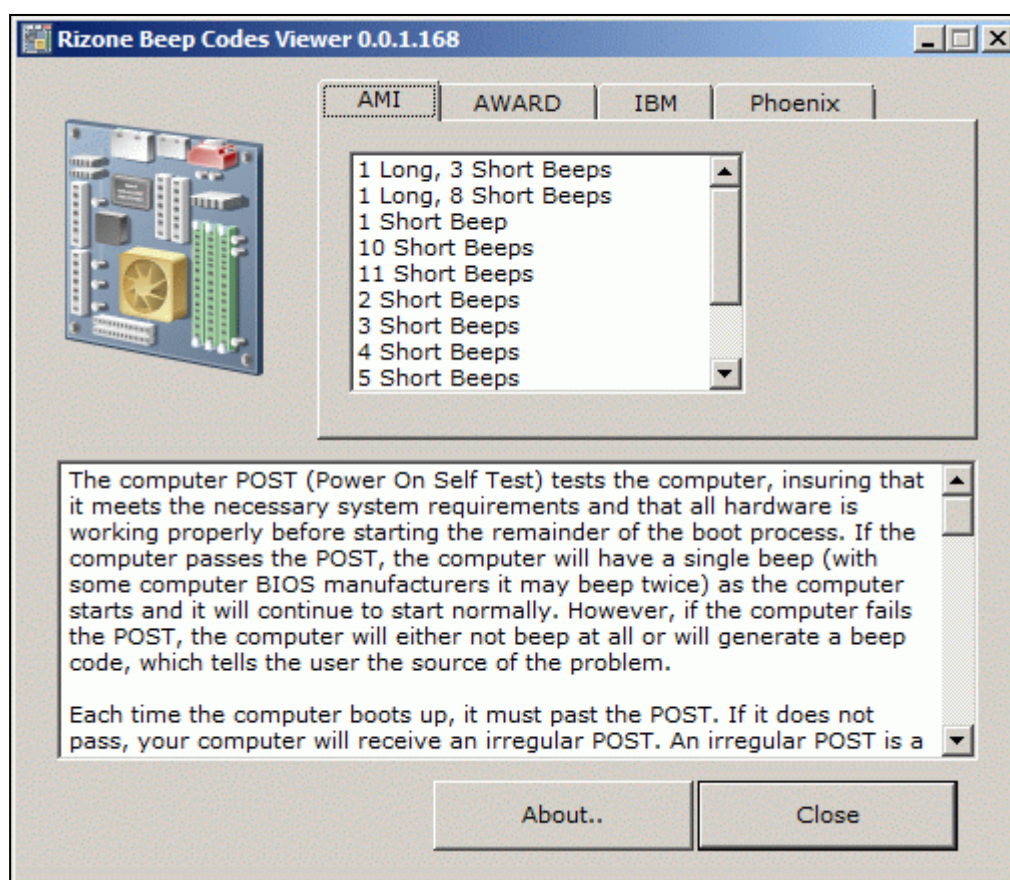
The information stored in CMOS is maintained by a small battery. If the CMOS battery loses its charge the computer may lose date and time information, and it may not boot correctly. All batteries lose their charge over time, and it will need to be replaced periodically.



BIOS battery

2.3 POST

BIOS contains a series of instructions that tests the computer's hardware for problems. These tests are collectively called the Power-on Self Test, or simply POST. POST is run before the computer's operating system is loaded. The POST checks the computer's hardware to ensure that the hardware is operational, and that the computer can start itself. BIOS check essential hardware components such as the memory, keyboard, hard drive and video. If an error is detected, BIOS will instruct the computer to display an error code. Error codes are usually presented as a series of beeps. The number of beeps varies with each computer manufacturer.

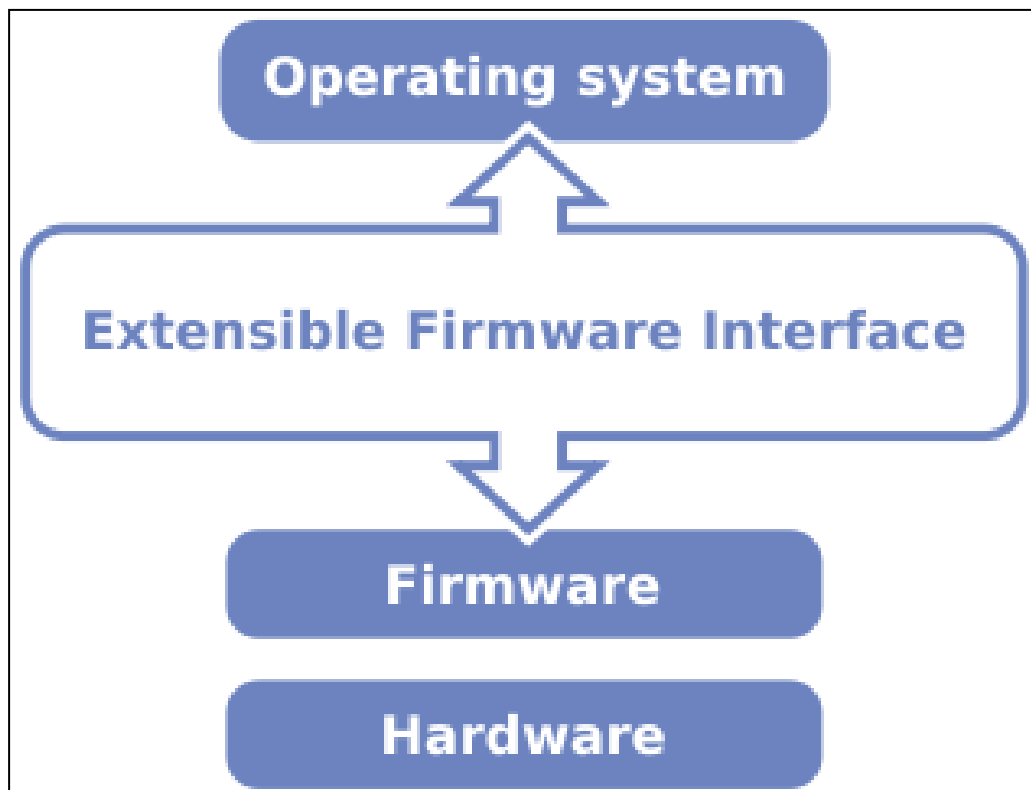


Error beep codes

2.4 EFI

Extensible Firmware Interface (EFI) was developed by Intel to replace the BIOS systems used by many computers. EFI creates a software interface between a computer's operating system and its firmware. EFI is a larger, and has more features than older BIOS systems. EFI is responsible for the POST process, and starting the computer's operating system.

EFI provides an interface between the computer's operating system and its physical hardware. This allows the operating system to be independent of the computer's firmware and hardware. EFI is designed to decrease compatibility problems that may exist between a computer's operating system and its hardware.



EFI model