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Clear CMOS Settings

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In this video from ITFreeTraining, I will look at how to clear the CMOS settings on a computer. When changes are made in the BIOS or UEFI, these settings are stored in the CMOS. This video will look at how to clear these settings which will return the computer back to its factory defaults.

BIOS and CMOS

South Bridge

Configuration settings Stored in CMOS or chipset

BIOS

Small chip with small amount of code to test/start/configure the computer

Power

CMOS Chip (Complementary Metal-Oxide Semiconductor)

CR2032 LITHIUM BATTERY リチウムバッテリー 3V

Power

2011 01 / 01 28 11 01

Real Time Clock (RTC)
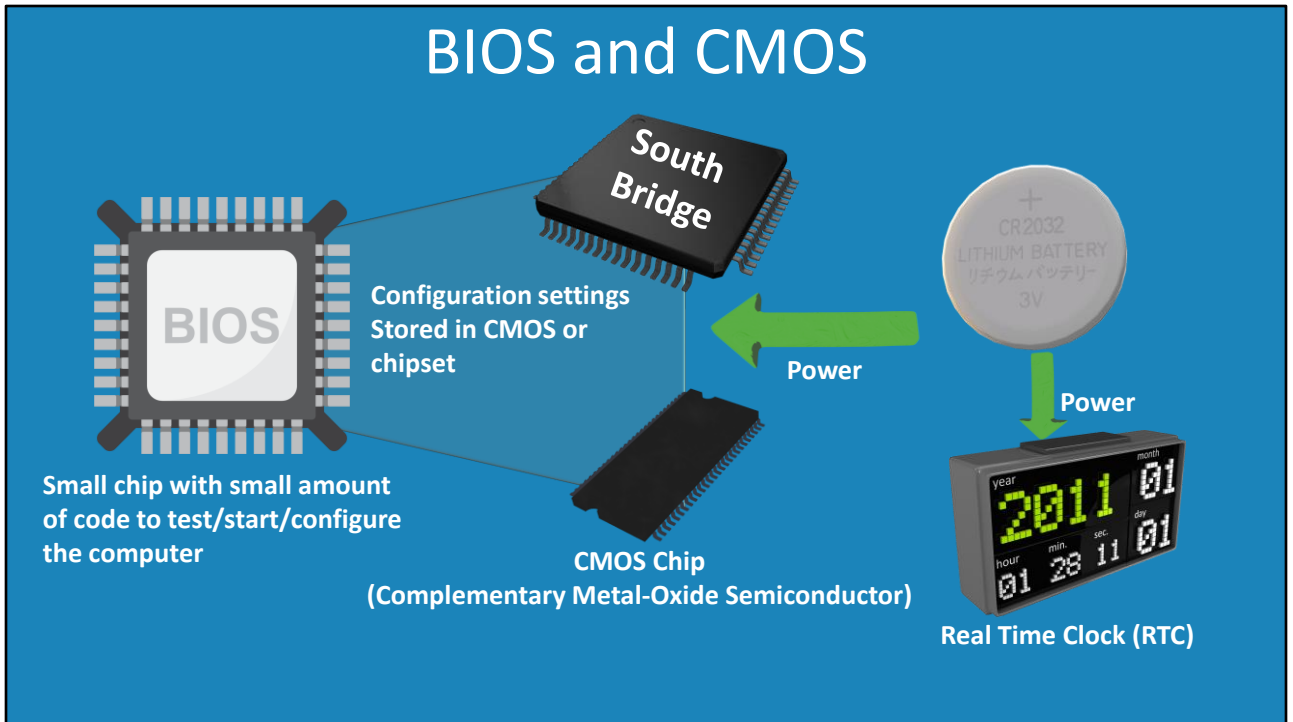
0:19 Before I start, I will first look at how the BIOS and the CMOS work. This will give you a better understanding of what happens when the settings are cleared. In this video, I will only refer to BIOS, but if you have a computer with a UEFI chip on it, the principal is the same and the procedures are also the same.

The BIOS is a small chip on the motherboard. This chip contains a small amount of code and when the computer is first switched on, this code tests the hardware and starts the computer.

The BIOS also contains setup software that allows configuration changes to be made to the computer. These configuration changes need to be stored somewhere, but cannot be stored in the BIOS because it is read only.

In the early days of computing, this configuration was stored in a chip called the CMOS. CMOS stands for complementary metal-oxide semiconductor. Nowadays, motherboards do not have a CMOS chip, but instead the configuration is stored in the South Bridge.

The size of this storage varies, but in modern motherboards it is around 64 kilobytes. The average computer may only require 100 bytes of storage depending on what options you configure. This storage is traditionally volatile, meaning that when the power to the computer is switched off everything in memory will be lost.

Since this data is the configuration for the computer, you need the configuration to be available even if the computer does not have power for long periods. To do this, the motherboard will

have a battery installed. This battery keeps the memory powered and thus data will not be lost between reboots.

You may be thinking, why not use flash RAM as it is non-volatile and thus keeps its values between power losses? A lot of modern motherboards use flash RAM and thus do not require power to keep their settings. Even if flash RAM is being used, the settings are still referred to as CMOS because administrators are so used to calling it by that name. If we are making the move to flash RAM, the question arises, do we still need the battery?

The battery is still found on modern motherboards because it is used to power the clock. The clock is referred to as the real time clock or RTC. The battery allows the clock on the motherboard to function even when the computer is not powered. This allows the computer to accurately keep track of the time, including the current date even if the computer is not connected to the power for a long period of time.

Now that we understand how the settings are saved, what happens if you make a change to CMOS on your computer and the computer becomes unbootable? The most common time this occurs is when a password has been configured and no one knows what that password is. When something like this occurs, you need a way of clearing the CMOS settings.
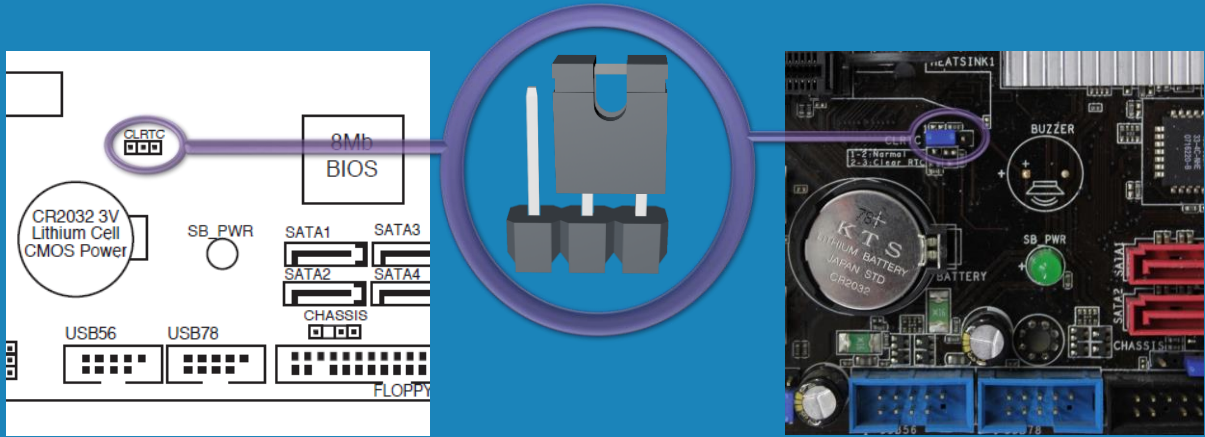
Clearing CMOS

- Motherboard has jumper to clear CMOS
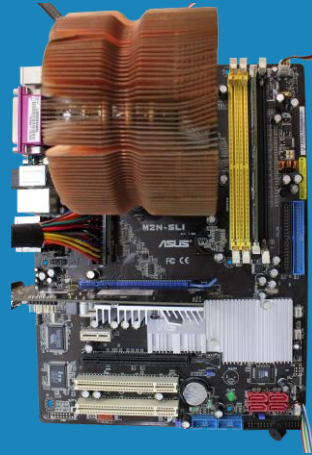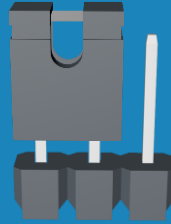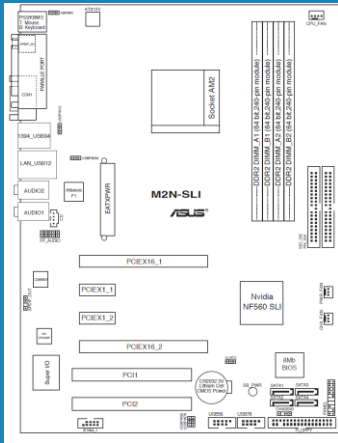
3:13 To clear the CMOS settings, which will set the motherboard back to factory defaults, there is a jumper on the motherboard. To clear the settings, move the jumper to the second position and start the computer up.

Clearing CMOS

- Motherboard has jumper to clear CMOS

3:25 If you have trouble locating the jumper, refer to the motherboard manual for its location. It is usually located next to the BIOS chip. There will usually be some printed text next to it help you find it. Usually it will have the letters CLRTC which stand for Clear Real Time Clock. Essentially you reset all the settings and also reset the real time clock. If you have a computer that you keep having to set the time and date on, chances are the battery on the motherboard is dead.

I will now have a look at how to reset the CMOS and also have a look at the effect removing the battery will have on the computer.

Demonstration

4:05 First, I will start the computer and press the delete key to enter the setup. Once in the setup, notice that the date is currently set correctly. Once I reset the CMOS setting, we will notice that the time and date will not be correct.

All the CMOS settings will be reset to their default values. To see the effect this will have, change to the boot menu. Once in the boot menu, I will select the option "Boot Device Priority". The boot devices are currently set on the default. I will change the boot order so only one setting is configured to "Hard Disk".

Once configured, I will save the settings and exit the BIOS. To clear the CMOS settings, I will now switch off the computer.

On the motherboard there is a jumper. This jumper needs to be removed and repositioned in order to clear the CMOS. You can see on this motherboard that the jumper is blue. If you have trouble locating the jumper, refer to your motherboard manual.

Notice that there are three pins. In the default position, the jumper is placed so that it connects the two pins closest to the PCI slots. Your motherboard may be different.

I will next pull the jumper out of the motherboard. You will notice that the jumper is essentially a small plug that when connected closes an electrical circuit.

The next step is to place the jumper back on the motherboard. Notice that when I place it back

on, this time I connect it to the two pins furthest away from the PCI slots.

With the jumper in place, I will now switch the computer on. Generally, most computers will start up, but you will only get a black screen and no beeps. This is because all the CMOS settings have been erased and it would not make sense to boot up. This is because, since the jumper is still in the clear CMOS position, if you were to configure any settings they would automatically be erased when the computer is switched on.

Generally, you only need to leave the computer on for a few seconds in order to ensure the CMOS is cleared. Since this computer has been on for at least a few seconds I will switch it off.

Once the computer is off, I will need to remove the jumper and place it back in the original spot. Once in place, I can start the computer back up again.

When the computer starts up, notice that this time I get an error message saying "CMOS checksum error – Defaults loaded". This essentially means all the CMOS settings have been lost.

I will next press the delete key and go into the setup. You will notice that the date has changed to 2008 indicating the time and date has been reset. I will now go to the boot menu; notice that the boot order has changed back to the default. So essentially all the CMOS settings including the date and time have been reset.

I will now change the boot order back to what it was and also change the time and date back. Once done, I will now exit the BIOS and switch off the computer. I will next remove the battery to see what effect this has on the computer.

To remove the battery, it is just a matter of releasing the latch holding the battery in place with a screw driver, freeing the battery so it can be removed. You will notice on this motherboard there is an LED that is lit when it is receiving power. Even though the battery has been removed, this won't make a difference if the power is plugged in, so I will unplug the power. It will usually take a few seconds for the power to dissipate from the capacitors. You will notice when this occurs as the light will switch off. Only some motherboards will have an LED to indicate power is connected, most do not.

Not all motherboards will have a light, but if you remove the power and the battery and wait a minute or so this should be more than enough time.

I will now put the battery back in. It is just a matter of pushing it back in until it clicks.

Once done, I will switch the power back on and start the computer up.

You will notice that like before, I will get an error message saying the defaults have been loaded. I will next press delete to go into the setup. On the first screen, you will notice that the date has been reset. If I also go to the boot menu, you will notice that these options have also been reset back to the defaults. If your motherboard is using flash RAM, removing the battery may or may not reset the CMOS settings. On this motherboard removing the battery has reset the settings.

In some cases, the battery on your motherboard may be dead. If this is the case, when booting the computer, you will receive a message saying the defaults have been loaded and the time and date have been reset.

If you have not configured the jumper or removed the battery, this message indicates that the battery needs to be replaced. This is a simple matter on most motherboards, to pull the old battery out and put a new battery in. On some motherboards, the battery is soldered onto the motherboard making it difficult to replace. Motherboards of this kind however are rare.

This concludes this video on clearing the CMOS settings on your computer. I hope you have found this video useful and I look forward to seeing you in other videos from us. Thanks for watching.

References
"The Official CompTIA A+ Core Study Guide (Exam 220-1001)" Chapter 3 Position 6115 - 6269"CompTIA A+ Certification Exam Guide Tenth Edition" pages 125 - 126

Credits
Trainer: Austin Mason http://ITFreeTraining.com
Voice Talent: HP Lewis http://hplewis.com