Sistemas Informáticos (Computer Systems)

Unit 08. Computer assembly and repair. Repair - Part 2

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Licencia

Nomenclatura

A lo largo de este tema se utilizarán diferentes símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:

📖 **Important**

❕ **Attention**

💬 **Interesting**

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1. Introduction

In this unit, we are going to learn how to detect hardware problems in a computer and several strategies to solve them.

📖 **Important:** Usually, problems are because of software mistakes. In this unit, we are going to learn how to detect hardware problems, not software problems.

Discover a hardware problem in a computer is a task that requires a lot of experience. In this unit we are going to give you numerous tricks, but each problem is different and always isn't possible to apply a standard solution.

2. Before start

2.1 First steps

In order to detect a hardware problem, first steps to take are:

- To check if power supply is working properly and distributing power to other components.
- To check if every connector and hardware component is connected properly.
- To check if RAM modules and expansion cards are inserted properly.
- To check if Hard disk, DVDs, … have connected power and data connectors.
- To check if case connectors are connected to motherboard.
- To check if peripherals like keyboard or mouse are connected properly.

If the computer doesn't start and there are several components connected, disconnect as much as you can and try to run the computer. If it works properly, try to connect components gradually and test which components fail.

When everything is checked, you have to try to start the computer. If the computer starts, but problems continue, you should check if fans are working properly.

If the computer starts properly, those first steps have solved the problem. If it doesn't, you have to look for the hardware problem.

2.2 Acoustic signals

There is a first system to check errors, acoustic signals produced by the BIOS/UEFI (very useful in situations where we got no signal on the screen).

Those signals are long or short beeps. Each BIOS/UEFI has their own signals, and you should check its meaning in your motherboard manual.

Generally, those signals are common:

- **Continuous beep**: problem with the power supply.
- **1 or 2 beeps** : damaged RAM or inserted badly.
- **2 short beeps and 1 or 2 long beeps**: graphic card damaged or inserted badly.

If graphic card and CPU work properly, it is possible that the computer shows an error message on the screen, and it gives us more information about the problem

3. Power supply

3.1 Symptom

The main symptoms are:

- Computer reboot or stop working without reason.
- Problems with LED intensity.
- The computer has problems when it uses components with high power demand (example: a 3D game that uses our graphic card at full speed) or when we connect too many devices to our computer.

3.2 Preventions

The main preventions are:

- To use surge protectors (devices that protect against voltage spikes).
- To use UPS (Uninterruptible Power Supplies) to avoid problems with power failures.

3.3 How to repair

Check if the power supply supports the power demand of connected components.

If it theoretically supports the power demand of the components, also try to remove components to check if it solves the problem. If it does, your power supply isn't producing the claimed power.

If it can satisfy power demand, you should buy a power supply with more power support.

If the power supply is broken, and you have electrical knowledge, maybe you could repair components of power supply, but usually the best option is to replace it with another one.

4. RAM memory

4.1 Symptom

The main symptoms are:

- Beeps when the computer starts.
- Checksum error on post.
- Blue screens or random problems with programs.
- Computer reboots randomly.

4.2 How to repair

You can try:

- To check if modules are inserted properly.
- To check if motherboard supports the installed RAM.
- To check if BIOS configuration fits with installed RAM (disable over-clock if it is enabled).
- To try different modules on different slots.
- To remove one or several modules and trying if, with that configuration, computer works properly.

If you detect a defective module, you should replace it.

5. CPU

5.1 Symptom

The main symptoms are:

- Computer doesn't start.
- Computer starts but stops working during boot.
- Computer starts but stops working randomly.

5.2 How to repair

You can try:

- To check if CPU is inserted properly.
- To check CPU temperature with BIOS or utilities. Usually when computer works it should be less than 50º.[1]
- To check if computer fan/cooler is working properly.
- To replace heat sink compound.
- To check if BIOS/UEFI configuration has over-clocked CPU and disable it.

If your fan/cooler isn't working properly, you should replace it. We recommend buy a cooler with better specs. If you detect a defective CPU, you should replace it with a working one.

6. MOTHERBOARD

6.1 Symptom

The main symptoms are:

- Computer doesn't start.
- Computer starts but show problems during POST.
- Motherboard LEDs (if it has) don't work.

6.2 How to repair

You can try:

- To check if all components are connected properly.
- To check if jumpers are in right positions.
- To check BIOS configuration or reset it to defaults (view "BIOS/UEFI configuration" section).

If you detect a defective motherboard, you should replace it with a working one.

7. GRAPHIC CARDS AND MONITORS

7.1 Symptom

The main symptoms are:

- You can't see anything in your screen.
- You can see things, but not in the proper way.

[1] You can check temperature ranges for several CPUs in http://www.buildcomputers.net/cpu-temperature.html

7.2 How to repair

You can try:

- To check computer with other monitor (to detect if it is a monitor problem or a graphic card problem).
- To check if monitor is connected properly to graphic card.
- To check if monitor cable is working properly.
- To check if graphic card is connected properly.
- To check if graphic card fan is working properly.

If you detect a defective graphic card or monitor, you should replace it with a working one.

8. STORAGE DEVICES

8.1 Symptom

The main symptoms are:

- Read / Write operations are getting slower.
- The operating system detects problems with a storage device or simply doesn't start.
- Damaged data.

8.2 How to repair

You can try:

- To check if boot sequence is in the right order.
- To check if device is connected properly.
- To check if wires to connect the device are not damaged.
- To Use software to scan/repair storage devices ("*chkdsk*" on Windows, "*fsck*" on Linux)

If you detect a storage device defective, you should backup information as soon as possible and replace it with a working one.

9. BIOS/UEFI CONFIGURATION

Usually BIOS/UEFI configuration doesn't change "by itself" and isn't the source of problems, but if you have a problem and don't know what is the source or your problem appeared when you changed BIOS/UEFI configuration, you should check if BIOS/UEFI configuration is right (over-clock problems, compatibility problems, CPU temperature, etc.).

If you can't find configuration problems, one possible solution is to restore BIOS/UEFI default options. It can be done from BIOS/UEFI itself or resetting CMOS (more information in https://www.computerhope.com/issues/ch000239.htm).

! **Attention:** If you can't access to BIOS configuration because computer doesn't start, you can try resetting CMOS following motherboard manual or simply removing motherboard's battery.

10. BIBLIOGRAPHY

[1] Tom/s Hardware https://www.tomshardware.com/

[2] Computer Hardware: questions and answers. http://www.computerhope.com/hardqa.htm