Troubleshooting Motherboards, RAM, and CPUs

# Lesson overview.

In this lesson, we will cover:

* Common symptoms.
* Troubleshooting tools.

# Common symptoms.

There are a number of things that can go wrong with motherboards, random access memory (RAM), and CPUs. Many of the common symptoms of problems experienced by motherboards, RAM, and/or CPUs are outlined below, along with the most likely causes that are indicated by those symptoms.

## Unexpected shutdowns.

If you are experiencing unexpected shutdowns, the most likely cause is heat. You will want to check the ventilation and clean out the fans. Additionally, you can check for fan operation.

#### Highlights:

* The most likely cause of unexpected shutdowns is heat.
* Check the ventilation and clean out fans.
* Also check for fan operation.

## System lockups.

With system lockups, the most likely cause is also heat. You will want to start by checking the ventilation and cleaning out the fans. Additionally, you can check for fan operation.

#### Highlights:

* The most likely cause of system lockups is heat.
* Check the ventilation and clean out fans.
* Also check for fan operation.

## POST code beeps.

If you get a series of beeps when you're booting up your system, you will need to do some research to determine the cause. Each manufacturer defines its own beep codes, so you need to refer to your system documentation to determine the actual cause for your POST code beeps. Another way of determining the problem is by using a POST code card (see the troubleshooting tools section below).

#### Highlights:

* The cause of any POST code beep will require some research.
* Each manufacturer defines its own beep code; refer to system documentation to determine the cause.

## Blank screen on boot-up.

If you boot up the system and you get a blank screen, the most likely cause is your onboard graphics. This is particularly prevalent in systems that have onboard graphics and an add-on card. The cord that goes from the monitor to the PC is most likely plugged into the wrong port.

#### Highlights:

* The most likely cause of a blank screen on boot up is the onboard graphics.
* If the system has onboard graphics and an add-on card, the most likely cause is the video monitor is plugged in to the incorrect spot.

## BIOS time and setting resets.

If your system isn't keeping the time or date correctly, the most likely cause is a low CMOS battery. The CMOS battery is the timekeeper for the system and retains user adjustable settings in BIOS as well.

#### Highlights:

* The most likely cause if your system isn't keeping the time or date correctly, is a low CMOS battery.
* The CMOS battery is the timekeeper and is what retains user adjustable setting in the BIOS.

## Attempts to boot incorrectly.

If your system attempts to boot to the incorrect device, the most likely cause is an incorrect BIOS setting. The BIOS has an incorrect boot order setting, which you will need to correct to get it to boot to the correct device. Use caution when making adjustments to settings in the BIOS, as a mistake can make matters worse.

#### Highlights:

* The most likely cause if your system attempts to boot to the wrong device is an incorrect BIOS setting.
* BIOS has the incorrect boot order priority.
* Use caution when making adjustments to BIOS settings.

## Continuous reboots.

If your system is suffering from continuous reboots, your problem can be hardware or software related. If you just installed new hardware, the most likely cause is an incorrect driver. If you haven't recently installed new hardware, the most probable cause is an update to the operating system. Additionally, an application that you use, or one that executes on boot up, may be causing problems with the system.

#### Highlights:

* Continuous reboots in a system can be hardware or software related.
* With new hardware, the most likely cause is an incorrect driver.
* If new hardware has not been added, a software update issue is the likely cause.

## No power.

The most probable cause when a system is not getting power is the power supply. You will want to check the plugs for the power supply to make sure they're plugged in where they're supposed to be. You can also check the settings for the power supply voltages. Additionally, you may need to verify that the wall outlet is supplying the correct voltages.

#### Highlights:

* The most likely cause of a system getting no power is the power supply.
* Check the plugs for the power supply and check the setting for the power supply voltage.

## Overheating.

If your system is suffering from overheating, there are a number of likely causes. This may be due to poor ventilation, inadequate cooling, or the system being overclocked. Check to make sure that the case fans are working and clean out the dust and debris. If the system is overclocked, return it to factory settings or install more cooling capacity (i.e., move to a liquid cooling system).

#### Highlights:

* The likely causes when a system is overheating are poor ventilation and/or inadequate cooling. Check to make sure that the case fans are working and clean out the dust and debris.
* Another cause may be that the system has been overclocked; return it to factory settings or install more cooling capacity (i.e., move to a liquid cooling system).

## Loud noises.

When a system begins making loud noises, the most likely cause is dirt. As fans become dirty, they must work harder to cool, which will increase the noise level of a system. Use compressed air to clean the fans. If that does not solve the problem, replace the fans, as they are going to fail soon.

#### Highlights:

* The most likely cause when a system starts making loud noises is dirt.
* Use compressed air to clean the fans. If that does not solve the problem, replace the fans, as they are going to fail soon.

## Intermittent device failure.

If your PC is suffering from intermittent device failure, the most likely cause is either a heat issue or bad RAM. If the ventilation is okay, you will want to run the memory diagnostic utility on your next system reboot to see if you have some bad RAM.

#### Highlights:

* The most likely cause is either heat or bad RAM.
* If the ventilation is okay, run the memory diagnostic utility.

## Only the fans power up.

When your fans spin but there's no power to other devices, the most likely cause is that there's no power to the CPU. This is caused when the power regulator on the motherboard has failed. The reason the fans still spin is that the fans don't require the CPU to run, whereas every other device does require the CPU to have power.

#### Highlights:

* If only the fans spin, the most likely cause is no power to the CPU. The power regulator on the motherboard has gone bad.
* Fans don’t require the CPU to run.

## Smoke.

If smoke is escaping from your PC, the most likely cause is the power supply. It could be a short in the power supply or the wrong voltage setting on the power supply. In either case, replacing the power supply may be required.

#### Highlights:

* If smoke is escaping from the PC, the most likely cause is the power supply.
* It could be a short in the power supply or the incorrect voltage setting on the power supply.
* Replacing the power supply may be required.

## Burning smell or sparks.

Closely related to smoke is a burning smell or sparks. If you have either of these symptoms, the most likely cause is also the power supply. Another possible cause is a short caused by nicks or cuts in the wiring insulation. If either is the problem, replacing the power supply may be required.

#### Highlights:

* The most likely cause for a burning smell or sparks is the power supply.
* It could be a short in the power supply or an incorrect voltage setting on the power supply.
* Another possible cause is a short caused by nicks or cuts in the wiring insulation.
* Replacing the power supply may be required.

## Blue screen of death (BSOD).

A faulty motherboard or RAM can cause the blue screen of death. Additionally, it could be a hardware related issue. When the BSOD appears, it also provides a code that will help you identify the issue. Check Microsoft's Knowledge Base to decipher the code.

#### Highlights:

* A faulty motherboard or RAM can cause the BSOD.
* Check with Microsoft's Knowledge Base to identify the BSOD code.

# Troubleshooting tools.

There are a number of troubleshooting tools that you can use to troubleshoot motherboard, RAM, and CPU issues. A screwdriver will give you access to the inside of the case, so that you can look at the motherboard, the CPU, and the RAM. A multimeter is another helpful tool for troubleshooting these items. It allows you to check to make sure that everything is getting the appropriate voltage. A fairly high quality multimeter should be used, as not all multimeters are created equal.

Another tool that you may want to consider acquiring is a power supply tester. This tool simulates the load on a power supply and display’s voltages, making it easy to test a power supply when you're having problems. A power supply tester is also useful for testing a power supply when you don't have a motherboard.

Another useful tool to have in your toolbox is a POST code card. It is an adapter card that plugs into a PCI or PCIe slot. A POST code card displays a code that will point out when and where a POST failure occurred. Some motherboards have POST code cards built into them, but not all of them. You may want to consider purchasing one so that you can learn the codes and become familiar with them.

#### Highlights:

* A screwdriver will allow you access to inside the case, so that you can check the motherboard, the CPU, and the RAM.
* A multimeter allows you to check for the appropriate voltages.
* A power supply tester will simulate the load on a power supply and display’s voltages.
* A POST code card is an adapter card that plugs into a PCI or PCIe slot and displays a code that will point out when and where a POST failure occurs.

# What was covered.

## Common symptoms.

Many motherboard, RAM, and CPU issues are related to excessive heat. Ensuring that there is sufficient cooling and keeping the inside of the cases clean will reduce the likelihood of problems occurring. The next most likely causes are related to power issues.

## Troubleshooting tools.

Use a good multimeter to find proper voltages. Power supply testers simulate the load on a power supply so that it doesn’t need to be plugged into a motherboard. POST code cards can display a code that can help pinpoint where a failure is occurring at POST.