

## 3.4.2 Motherboard Troubleshooting Facts

Common motherboard issues include those discussed in the following table:

| Issue                      | Description  |
|----------------------------|--|
| Power Issues               | <p>Power supplies wear out over time, especially if they're overheated or overstressed. If the power supply can't provide adequate amounts of electricity to the system, the computer may exhibit one of several behaviors:</p> <ul style="list-style-type: none"> <li>It may unexpectedly shut down.</li> <li>It may continuously reboot itself.</li> <li>It may not power on at all.</li> </ul> <p>Pin 8 on the power supply connector connects to the power good wire on the motherboard. If power disappears off that wire, the motherboard shuts down. If power quickly reappears on that wire, the system may attempt to come back on by itself, resulting in continual reboots. If power does not reappear on this wire, then the system will shut off. For example, a failing power supply may not provide enough voltage on this wire for the system to initially boot up.</p> <p>If these symptoms are observed, test the power supply to determine if it's the source of the problem. Turn the power supply on and then test the voltage supplied on either a motherboard connector or on a hard disk connector. If the voltage is less than expected, then the power supply may be at fault. For example, if a 12 volt wire is carrying less than 11 volts, the power supply is probably failing. If this is the case, do the following to rectify the issue:</p> <ol style="list-style-type: none"> <li>Purchase a new power supply.</li> <li>Remove the old power supply from the system</li> <li>Mount the new power supply.</li> <li>Connect the new power supply to the motherboard and to all other internal devices.</li> <li>Power the system on and verify that the symptoms have been eliminated.</li> </ol> |
| Boot Errors                | <p>A malfunctioning motherboard may generate error codes when the system is powered on. Every time the PC boots, it runs a <i>Power On Self-Test</i> (POST) to make sure all of the basic hardware in the system is present and functioning correctly. If a problem is identified during POST, an error is generated. How the error message is reported to the end user depends upon the motherboard manufacturer. The following may be used:</p> <ul style="list-style-type: none"> <li>Audible beeps</li> <li>Numeric codes</li> <li>Error messages</li> </ul> <p>The actual codes and messages will vary by manufacturer. Check the motherboard documentation for specific details. For example, a numeric 201 error code may indicate a memory problem on some systems, while a 301 error indicates the keyboard did not respond correctly during POST.</p> <p>Sometimes, a computer system may experience problems (such as a malfunctioning video adapter) that can prevent error messages from being displayed during POST. If this is the case, use a <i>POST card</i> to access POST error codes. Most models use an LED display to report any error codes generated during POST. A POST card is commonly implemented as an expansion board that is inserted into an expansion slot in the motherboard. However, some POST cards also include a USB interface that allows them to be connected to computers that don't have expansion slots, such as a notebook system.</p>   |
| Distended Capacitors       | <p>Over time, the capacitors on the motherboard may become overstressed or overheated. When this happens, they may bulge or even begin to leak fluid. Distended capacitors usually fail at some point, causing the motherboard to fail. For example, if the fans in the power supply spin up when you power on a system, but the motherboard itself doesn't start, it is possible that capacitors on the motherboard have become distended.</p> <p>If this happens, inspect the motherboard and look for capacitors that are swollen on top or leaking brown liquid. While it is possible to carefully replace a failed capacitor on the motherboard, it is usually faster and more cost-effective to replace the entire motherboard.</p>  |
| Missing BIOS/UEFI Settings | <p>A constant source of power is required to store the settings configured in the motherboard BIOS/UEFI chipset. The motherboard also needs constant power to keep the system clock running while the system is powered off. Most motherboards implement a small battery that provides this power. If this battery starts to fail, then the following may occur when the system is powered on:</p> <ul style="list-style-type: none"> <li>The system clock loses time.</li> <li>Settings configured in BIOS/UEFI are lost.</li> </ul> <p>If this happens, it's likely that the motherboard battery has failed and needs to be replaced.</p>  |
| Overheating                | <p>Internal system components within a computer generate a great deal of heat that must be dissipated. Overheating causes premature component failure. Overheating could be caused by several conditions:</p>  |

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|-----------------------------|---|
|                             | <ul style="list-style-type: none"> <li>▪ Inadequate air flow. This may be the result of an inadequate number of fans in the system or fans that are too small. In this situation, additional fans can be added to the system to increase air flow.</li> <li>▪ Improperly installed fans. Fans must be oriented to force air through the system in the same direction, otherwise they may fight against each other and prevent air from flowing properly.</li> <li>▪ Failing fans. A failing fan moves less air than a properly functioning fan. It's not uncommon for a failing fan to generate a screeching noise that is caused by worn parts within the fan assembly. This condition can be fixed by replacing the failing fan.</li> <li>▪ Dust buildup. Excessive dust within the system can block air flow and cause overheating. Use compressed air or an anti-static vacuum to remove dust buildup.</li> <li>▪ Environmental heat. If the air temperature outside the computer is already overly warm, then the temperature inside will be overly warm as well. A properly balanced HVAC system must be implemented in the work area to remove excess heat from the environment.</li> </ul> <p>The internal temperature of computer systems should be monitored. Most motherboards include several sensors that can be used to monitor the system temperature. Usually, the current temperature can be viewed within the BIOS/UEFI setup. There are also software applications available that can read the current temperature values from the sensors and display them on screen. Unlike using a BIOS/UEFI monitoring utility, these tools allow the temperature to be monitored dynamically while the system is in use.</p> <p>Most motherboards include a thermal shutdown feature. If the system temperature rises too high, the thermal shutdown feature immediately shuts the computer down to prevent component damage. However, it typically does not shut the system down cleanly, so there is a risk of data corruption if this happens.</p> |
| Intermittent Device Failure | <p>Intermittent device failure occurs when a component occasionally stops working. This usually indicates that the device itself is failing. The best remedy is to replace the failing device because it will fail completely at some point. Immediate replacement prevents this from happening.</p> <p>Intermittent device failures may also be caused by device drivers that aren't functioning properly. Device drivers are software and may contain coding errors. Before replacing a device experiencing intermittent failures, first verify that the latest drivers for that device have been loaded. Sometimes downloading the latest driver and installing it will solve the problem. If it doesn't, then the device itself may need to be replaced.</p>  |
| Smoke or Burning Smell      | <p>If smoke or a burning smell is observed coming from a computer, it indicates that electricity is not flowing in the correct manner within the system. If smoke is observed, shut the system off immediately. This issue could be caused by:</p> <ul style="list-style-type: none"> <li>▪ A connector that isn't seated properly and electricity is arcing between leads.</li> <li>▪ A short circuit in the printed circuit board of the motherboard itself or on an expansion board.</li> <li>▪ An improperly installed component.</li> </ul> <p>Unfortunately, a component that is smoking has probably already been damaged to some degree. It's unlikely that it will ever function properly again. Replacement components are usually required.</p>  |