Preventive Maintenance

Preventive maintenance is the regular and systematic inspection, cleaning, and replacement of worn parts, materials, and systems. Effective preventive maintenance reduces part, material, and system faults, and keeps hardware and software in good working condition.

Troubleshooting is the systematic process used to locate the cause of a fault in a computer system and correct the relevant hardware and software issues.

In this chapter, you will learn general guidelines for creating preventive maintenance programs and troubleshooting procedures. These guidelines are a starting point to help you develop your preventive maintenance and troubleshooting skills.

Benefits of Preventive Maintenance

Preventive maintenance is implemented via a plan. While there are several considerations for preventive maintenance needs, preventive maintenance plans are developed based on at least two factors:

• **Computer location or environment** - Computers that are exposed to dusty environments, such as those used on construction sites, as shown in the figure, require more attention than computers located in an office environment.

• **Computer use** - High-traffic networks, such as a school network, might require additional scanning and removal of malicious software and unwanted files.

To create a preventive maintenance plan, document the routine maintenance tasks that must be performed on the computer components and the frequency of each task. You can then use this list of tasks to create a maintenance program.

Be proactive in computer maintenance and data protection. By performing regular maintenance routines, you can reduce potential hardware and software problems. Regular maintenance routines reduce computer downtime and repair costs. Preventive maintenance also offers these benefits:

• Improves data protection

• Extends the life of the components

• Improves equipment stability
• Reduces the number of equipment failures

Preventive Maintenance Tasks

Hardware

Check the condition of the cables, components, and peripherals. Clean components to reduce the likelihood of overheating. Repair or replace any component that shows signs of damage or excess wear.

Use these tasks as a guide to creating a hardware maintenance program:

• Remove dust from fan intakes.
• Remove dust from the power supply.
• Remove dust from the components inside the computer and peripheral equipment such as printers.
• Clean the mouse, keyboard, and display.
• Check for and secure any loose cables.

Software

Verify that installed software is current. Follow the policies of the organization when installing security updates, operating system updates, and program updates. Many organizations do not allow updates until extensive testing has been completed. This testing is done to confirm that the update will not cause problems with the operating system and software. The figure shows the Windows 7 Update screen.

Use these tasks as a guide to creating a software maintenance schedule that fits the needs of your computer:

• Review and install the appropriate security updates.
• Review and install the appropriate software updates.
• Review and install the appropriate driver updates.
• Update the virus definition files.
• Scan for viruses and spyware.
• Remove unwanted or unused programs.
• Scan hard drives for errors.
• Defragment non-SSD hard drives.

Clean the case and Internal components

An important part of hardware preventive maintenance is to keep the computer case and internal components clean. The amount of dust and other airborne particles in the environment and the habits of the user determine how often to clean the computer components. Regularly cleaned or replaced air filters in the building in which the computer is used will significantly reduce the amount of dust in the air.

Dust or dirt on the outside of a computer can travel through cooling fans and loose computer case covers to the inside. When dust accumulates inside the computer, it prevents the flow of air and reduces the cooling of components. Hot computer components are more likely to break down than properly cooled components. Most cleaning is to prevent this accumulation of dust. The image on the left shows a cooling fan that has accumulated an excessive amount of dust.

When dust accumulates inside the computer, it prevents the flow of air and reduces the cooling of components. Several components are important to keep clean:

• Heat sink and fan assembly
• RAM
• Adapter cards
• Motherboard
• Fans
• Power supply
• Internal drives

To remove dust from the inside of a computer, use a combination of compressed air, a low-air-flow ESD vacuum cleaner, and a small lint-free cloth. The air pressure from some cleaning devices can generate static and damage or loosen components and jumpers.

You can use a low-air-flow ESD vacuum cleaner to remove collected dust and materials from inside the bottom of the case. You can also use the vacuum cleaner to pull in the dust blown around from the compressed air. If you use compressed air from a can, as shown in the image, keep the can upright to prevent the fluid from leaking onto computer components. Always follow the instructions and warnings on the compressed air can to keep a safe distance from sensitive devices.
and components. Use the lint-free cloth to remove any dust left behind on the component.

**CAUTION:** When you clean a fan with compressed air, hold the fan blades in place. This prevents overspinning the rotor or moving the fan in the wrong direction.

Regular cleaning also gives you a chance to inspect components for loose screws and connectors. Look for things that might cause a problem later and correct them, such as the following:

- Missing expansion slot covers that let dust, dirt, or living pests into the computer
- Loose or missing screws that secure adapter cards
- Missing cables
- Loose or tangled cables that can pull free from the case

Use a cloth or a duster to clean the outside of the computer case. If you use a cleaning product, do not spray it directly on the case. Instead, put a small amount onto a cleaning cloth or a duster and wipe the outside of the case.

**Inspect internal components**

The best method of keeping a computer in good condition is to examine the computer on a regular schedule. This is a basic checklist of components to inspect.

- **CPU heat sink and fan assembly** - Examine the CPU heat sink and fan assembly for dust buildup. Make sure that the fan can spin freely. Check that the fan power cable is secure. Check the fan while the power is on to see the fan turn.

- **RAM connections** - The RAM chips should be seated securely in the RAM slots. Sometimes the retaining clips can loosen. Reseat them, if necessary. Use compressed air to remove dust.

- **Storage devices** - Inspect all storage devices. All cables should be firmly connected. Check for loose, missing, or incorrectly set jumpers. A drive should not produce rattling, knocking, or grinding sounds. Read the manufacturer’s documentation to learn how to clean the optical drive and tape heads. You can buy laser lens cleaning kits for computer optical drives. Tape head cleaning kits are also available.

- **Adapter cards** - Adapter cards should be seated properly in their expansion slots. Loose cards can cause short circuits. Secure adapter cards with the retaining screw or clip to avoid having the cards come loose in their expansion slots. Use compressed air to remove dirt and dust on the adapter cards and the expansion slots.

- **Screws** - Loose screws can cause problems if they are not immediately fixed or removed. A loose screw in the case can cause a short circuit or roll into a position where the screw is hard to remove.
• **Cables** - Examine all cable connections. Look for broken and bent pins. Ensure that all connector retaining screws are finger-tight. Make sure cables are not cramped, pinched, or severely bent.

• **Power devices** - Inspect power strips, surge suppressors (surge protectors), and UPS devices. Make sure that there is proper and unobstructed ventilation. Replace the power device if it does not work properly.

• **Keyboard and mouse** - Use compressed air to clean the keyboard, mouse, and mouse sensor.

**Environmental concerns**

An optimal operating environment for a computer is clean, free of potential contaminants, and within the temperature and humidity range specified by the manufacturer. With most desktop computers, the operating environment can be controlled. However, due to the portable nature of laptops, it is not always possible to control the temperature, humidity, and working conditions. Computers are built to resist adverse environments, but technicians should always take precautions to protect the computer from damage and loss of data.

Follow these guidelines to help ensure optimal computer operating performance:

• Do not obstruct vents or airflow to the internal components. A computer can overheat if air circulation is obstructed.

• Keep the room temperature between 45 to 90 degrees Fahrenheit (7 to 32 degrees Celsius).

• Keep the humidity level between 10 to 80 percent.

Temperature and humidity recommendations vary by computer manufacturer. You should research these recommended values, especially if you plan to use the computer in extreme conditions. Refer to the figure for humidity and temperature examples.

**CAUTION:** To avoid damaging computer surfaces, use a soft, lint-free cloth with an approved cleaning solution. Apply the cleaning solution to the lint-free cloth, not directly to the computer.