



# PC Preventive Maintenance Guide

## Technical Manual

### The PC Preventive Maintenance Inspection

#### Introduction:

We perform the Preventive Maintenance Inspection (PMI) to preserve the reliability of the equipment we use. Through careful inspection, cleaning, and maintenance, our computer workstations will perform better and last longer than those that are neglected. The PMI also allows us to detect serious problems before they occur and perhaps prevent system crashes and reduce equipment down time. Preventive maintenance is also periodic in nature. In fact, PMI sometimes stands for Periodic Maintenance Inspection. The period between PMI's from site to site. It mostly depends on how dirty things get. However... You should never really go more than 30 days without performing a solid PMI on a personal computer. There is a more detailed schedule outlined in the table below.

PC Preventive Maintenance Schedule		
Frequency	Component	Maintenance Description
<b>Daily</b>	System	Run a virus scan of the memory and hard disk.
	Hard Disk	Create a backup if you have updated important data or program files.
<b>Monthly</b>	Case	External cleaning.
	Hard Disk	Recover lost clusters and de-fragment.
	Keyboard	Clean and check for stuck keys.
	Mouse	Clean and check for wear.
	Monitor	Clean, degauss, and adjust.
	Printer	Clean and dust.
	System	Perform a diagnostics quick test.
	System	Install OS and software patches and updates.
	<b>On Failure</b>	Floppy Disk
CDROM		Clean the pickup lens.
<b>Yearly</b>	Case	Open and dust.
	Mainboard	Check chips for chip lift and reseat if necessary.
	CMOS	Test the backup battery.
	Adapter Cards	Clean contacts with contact cleaner and reseat.
<b>As Required</b>	CMOS	Record and backup CMOS setup configuration.
	System	Keep written record of hardware and software configuration of PC system.

#### Research Resources:

Company	Web Site	Description
WLSetzer	<a href="http://wlsetzer-pcc.home.att.net/pc_tips.html">http://wlsetzer-pcc.home.att.net/pc_tips.html</a>	PC Maintenance Tips
MSDS-Search	<a href="http://www.msdssearch.com/">http://www.msdssearch.com/</a>	Material Safety Data Sheets for hazardous products.
Microsoft	<a href="http://www.windowsupdate.com">http://www.windowsupdate.com</a>	Online Windows Update utility.

#### Words and Terms You Should Know:

- PMI
- Rattle Test
- Solvent
- Chip Lift
- Reseat
- Mechanical Mouse
- Mouse Retainer Clamp
- POST
- Degauss
- Computer Diagnostics
- Wet Cleaning Diskette
- Defragmentation

## The PC PMI Overview:

### *Required Tools and Materials*

In addition to your computer workstation you will need the following: Soft bristle brush, compressed air, spray and wipe cleaner, cotton swabs, cloth or paper towels, diskette cleaning kit, a digital multimeter, and diagnostic diskettes. You will also need some basic tools from your PC technician tool kit.

### *Initial Workstation Inspection*

Before you start make sure that you have a valid work order. Next, closely examine the entire workstation to see if there are any broken or missing parts and list them on the work order. Also, look to see if the power supply selector switch is set to the right voltage, and both monitor and computer are plugged in to power. See that the monitor cable is connected to the computer video card and that the keyboard and mouse are plugged into the correct ports.

Turn the monitor on and let it warm up for half a minute or so. Next, turn on the computer and watch the screen carefully to see if the boot commands as they come up and let the operating system start. If they don't, turn it off because there's a problem. Ask your supervisor for help if you can't immediately figure out what the problem is. When you're finished, turn everything off and remove all cables from the back of the computer.

### *CPU PMI*

The workstation PMI starts with a preventive maintenance and inspection of the CPU or the Central Processing Unit.

**Inspection** - Before you start, do a rattle test. Gently rock the CPU back and forth while listening for loose and traveling parts. If the CPU fails the rattle test locate the problem and report your findings to your supervisor. You'll have to remove the cover of the CPU chassis. If you're not sure which screws to remove ask you supervisor.

**Removing the Cover** - Use a ¼ inch spin socket or #2 Phillips screwdriver to remove the cover screws. Cracking open the CPU case is sometimes the toughest part of the PMI. Different manufacturers have different case designs. Some are flip-tops, some snap open like a clamshell, still others use screws and interlocking tabs. Typically, there are usually 4 or 5 screws holding on the cover. These screws are found around the edge of the back panel. Remove the screws and place them in your parts box or bag.

Remove the cover by sliding the cover back and lifting it over the top of the CPU. After the cover is off inspect the inside of the CPU. Look for evidence of burnt cables, loose connectors and charred components. Record these suspect parts and a brief description of their defect on your work order.

**Safety Tip:** Remember... Computers are electrical devices and can cause electrical shock. For safety reasons you must remove all rings, watches, and jewelry before working inside the computer cabinet. It's true. There's only 12 VDC and 5VDC inside the computer cabinet. That certainly won't shock you, but if your ring, bracelet, or wrist watch brushes against the circuits on a circuit board... It could be costly. Please take off all rings, watches, and jewelry before opening the computer cabinet.

**Testing the CMOS Backup Battery** - Next we'll be testing the backup battery. The CPU clock and the CMOS configuration is powered by this battery when the computer is off. This battery doesn't recharge and it needs to be replaced every few years. Locate the battery, if you have trouble ask your supervisor for assistance.

It's a good idea to check the battery during a PMI. Before you start, the CPU must be turned off. Next set the digital multimeter to measure DC volts, and measure the voltage of the battery. The best way to do this is to press the **black (-)** meter lead against the metal case and the **red (+)** meter lead against the top of the battery. The voltage should read above 2 volts. If not, the battery needs to be replaced. Turn the multimeter off when you're finished.

**Chip Lift** – Over time, IC's that are installed in sockets tend to lift up a bit. Sometimes this will cause a digital circuit to break in turn causing the computer to crash. With exception to the BIOS and microprocessor, most chips are soldered in place these days. To correct chip lift, simply push the IC back down against the mainboard to reseat them in their sockets.

**Interface Cards** – Adapter cards also have the annoying habit of lifting up and out of the socket. The gold-plated contacts also become tarnished and periodically need to be cleaned. Special cleaners called "contact cleaners" clean away this nuisance oxidation. Once a year, you should remove the interface cards and clean the edge connector with contact cleaner. For real tough oxidation, you can use a clean pencil eraser to gently remove the tarnish on the contacts. Rub only hard enough to removed the tarnish and not the gold plating. You also need to clean away all the eraser shavings when you're finished. Wipe off the excess cleaner, allow the adapter card to dry, and then reseat the interface card.

**Internal Cleaning** - Now that the cabinet's opened, use a vacuum or compressed air to carefully remove dust and debris from the computer circuit boards, power supply, and disk drives. You can also use a soft-bristled brush to knock the dust loose if necessary. It's also a good idea to check connectors to make sure they're well seated. After the cabinet is blown out reinstall the CPU cover while being careful not to pinch any cables or knock connectors loose as you reinstall the CPU cover.

**Safety Tip:** The CPU is an electrical device. Never spray liquids directly into the opening of the CPU case. It will cause damage to the circuits. Instead, spray the cleaner onto a towel or brush and then use it to clean the surfaces. Be sure to wipe away excess cleaner with a clean towel.

**External Cleaning** – Wipe down the cabinet removing all smudges making it look like new. Pay particular attention to the power and reset buttons as well as the floppy and CDROM drives ...anywhere the user touches. Remove any mark, marks, or unnecessary labels on the computer cabinet. Make it look like new.

**Tech Tip** – Getting rid of labels, stickers, tape, marks, stains, and scuffs is an art in itself. You need to find a solvent that will remove the adhesive or mark without removing paint or dissolving plastic. It's not a good idea to use solvents like acetone or nitro because they react with most plastics and remove paint. There are several citrus-based solvents (Goo Gone, Sticker Lifter, Stenza, E-Z Sticker Remover) that are designed to for just this purpose. Good old WD40 does a pretty good job too. The thing to do is to test the solvent before you do some real damage. Try the solvent on some hidden part of the case to make sure the solvent doesn't discolor or dissolve what ever it is that you're trying to clean.

**Safety Tip** - As always, you need to be concerned about safety as well. Some solvents are flammable, poisonous, and noxious. Others are absorbed directly through your skin causing damage to your liver and other vital organs. Therefore, you need to be familiar with the proper handling of these dangerous chemicals. Always refer to the Materials Safety Data Sheet (MSDS) to determine the proper use and storage of chemical solvents and solutions. You can find most MSDS information at <http://www.msdssearch.com/>.

The final step is to set up the CPU for use. Reconnect the power, video, mouse, and keyboard connections before you proceed to the next section. As a trainee, it's important to have your supervisor check your work before you continue.

**Safety Tip:** Remember... Monitors are high voltage devices. Before you do any work on the monitor, make sure it's turned OFF... In fact – unplug it! Also... You should never spray any liquid directly onto the openings of the monitor case or screen. In addition, make sure you're not wearing an ESD wrist strap while working on a monitor. A high voltage discharge through your body and the wrist strap to ground could hurt or kill you.

### *PC Monitor*

For obvious reasons, the PC Monitor typically requires the most amount of maintenance. Getting grubby fingerprints off the monitor screen seems to occupy the most time during the PMI. Before you inspect the monitor you should place it on a table so it can be adjusted to a comfortable viewing position. Inspect the monitor for any missing or broken parts. If there are any, make sure you record the parts and a description of their defect on the work order. Next... Do a rattle test. To do this, lift the monitor and then tilt it side to side and listen closely. You shouldn't hear any loose or traveling parts rolling around in the machine. If you do, report it to your supervisor.

**Tech Note:** Some monitors automatically select the proper voltage when they're connected to power. Read the information label on the back of the monitor to determine if the monitor is auto-switching. Plugging in a monitor to the incorrect voltage will destroy it.

**External Cleaning** - To clean the air vents, use a vacuum with a brush attachment. For tough dirt... Use a stiff bristled brush that has been dampened with a cleaner. For dirt jammed into the seams of the monitor case... Use cotton swabs damp with cleaner. Spray the cleaner onto a brush or swab and clean the areas that need attention. Make sure to wipe away all the excess cleaner with a soft cloth.

Next clean the monitor's outer covering, screen and external surfaces with a lint free towel that has been dampened with cleaner. Make sure you clean off all smudges or streaks that you find. Plug the monitor back in when you're finished. Since you're a trainee, be sure and check with your supervisor before continuing to the next section.

### *PC Keyboard*

**Inspection** - As with all components that receive a PMI, the first step is an initial inspection. Examine the keyboard and make sure there are no missing or broken parts. Then pick up your keyboard and shake it around a bit. Be sure that there is nothing shaking around inside such as loose pieces or other foreign objects. Small objects such as bits of paper, staples, and paperclips make their way into a keyboard causing it to malfunction. If you do find something you can't shake loose, go ahead and let your supervisor know.

**Cleaning** - Before cleaning the keyboard, make sure the computer is turned OFF. You'll also need to collect a few tools: A soft bristled brush, a vacuum or compressed air, a few cotton swabs, a bottle of spray cleaner, and some paper towels. To begin cleaning, get a soft bristled

paintbrush and dust between the keys. You might notice some dust and other particles falling from the keyboard. Then vacuum the keyboard or use compressed air get rid the remaining debris.

If you really want to get the keyboard clean, remove the -, +, and Enter keys from the numeric keypad to create a cleaning hole. You can remove the keycaps with a keycap puller or by prying it up with a small screwdriver. Brush all the garbage down to cleaning hole and blow or vacuum it out. Be sure to replace the keycaps in the right locations.

**Tech Tip** – Taking apart a keyboard varies from manufacturer to manufacturer. Some are assembled with screws while others are snapped together. Close examination of the bottom of the keyboard will reveal how it's put together. If you're lucky, you might find a series of Phillips screws. This type of keyboard is easy to disassemble without damaging it... Just remove the screws. If there are no screws, then the keyboard is snapped together and a little tougher to disassemble without breaking it. It's easy to damage the snaps when trying to pry the keyboard shells apart.

Now for the time consuming part... Take a few cotton swabs, spray a little detergent on them or soak them in alcohol. Use the swabs to clean the tops and sides of all the keys. Get rid of all the grime from all those filthy... filthy fingertips. Finally, take a lint free towel and spry some cleaner on it. Use this to wipe off the rest of the keyboard. Also, try and remove any tape or unauthorized labels on the keyboard.

### *PC Mouse*

Believe it or not... The wheeled (mechanical) mouse requires a significant amount of maintenance. Primary because the mouse ball continually picks up dust, dirt, and oil as it's used. The mouse ball deposits all this on the rotors and tension roller making mouse action bumpy and erratic. It's enough to drive a user crazy. On the other hand, an optical mouse has no mouse ball, no rotors, and no tension roller. The only maintenance on this type of a mouse is external cleaning.

**Inspection** - To begin a mouse PMI, examine the mouse looking for any broken or missing parts. Rattle test the mouse by flipping it end over end. Listen for any loose components traveling around inside the mouse. Inspect the mouse ball for pits, cracks, or scratches. You should also make sure the mouse ball is perfectly round. If there are any defects, report your findings to your supervisor.

**Mouse Disassembly** – To clean the rollers, you'll need to get to access to inside of the mouse. The first step is to remove the mouse retainer clamp or ring on the bottom of the mouse. A simple twist of the clamp should do the trick. Remove the ball and use compressed air to blow away any dust or debris from inside of the mouse housing.

**Tech Tip** – Much of what you need access to inside a mouse can be achieved through the mouse ball opening. If you need further access, you may need to open the mouse housing. Most mouse housings are held together with a single screw that's found on the bottom of the bottom of the mouse. It may be hidden under a label or perhaps under a nylon glide strip.

Spray some detergent into a lint free towel and use it to clean the mouse ball. Do not soak or scrub the ball. Also, never use alcohol or any other petroleum distillate to clean rubber or plastic components like the mouse ball and rollers. Solvents like alcohol dry out the oils that make the rubber pliable. Without this oil, rubber will shrink and evenly start cracking. Therefore, the only thing you should use to clean rubber and plastic is a mild detergent.

Finally, spray some cleaner on a cotton swab and clean the three plastic rollers. You may need to gently scrap the rollers with your fingernail or the wooden end of the swab to break the dirt loose. Make sure everything is dry before reassembly.

### *OS, System, and Drive Maintenance*

There are six areas that address OS, System, and Drive Maintenance conducted during a PMI.

- Workstation Inspection
- OS and Software Update
- Data and Information Backup
- Diagnostics Testing
- Floppy Disk Drive Cleaning
- Hard Drive Maintenance

**Workstation Inspection** - Before you start make sure the power, monitor, keyboard and mouse cables all are properly connected. Turn ON your monitor, wait for it to warm up and then turn the computer ON. There should be various boot-up messages flashing on the screen. This is all part of the Power On Self-Test (POST). If you don't see these messages or there is a POST error, ask your supervisor for help.

**OS and Software Update** – Updating the operating system and application software is part of the preventive maintenance inspection. Install the latest service packs, updates, and device drivers to make your installation both reliable and secure. All system upgrades are available on the Microsoft website at [www.windowsupdate.com](http://www.windowsupdate.com). Windows 2000 and XP also include an auto-update feature that informs the user if an update is available and then permits them to download and install the update.

It's essential that you also update the workstation's software ...especially the Anti-virus software and signature files. Other software updates that are carried out during a PMI are to the main application software like Microsoft Office. These updates typically include security patches that protect the computer from virus or Internet attacks. Because you may not have access to the Microsoft Website, smart techs carry the latest update files with them on CDROM service disk.

**Data and Information Backup** – Lost data and other computer information is of chief concern to both the corporate and private customer. Periodically backing up the hard disk drive data gives the customer a chance to recover what might have been lost forever. After backing up that hard disk, be sure to store the backup media in a cool dry place.

**Tech Tip:** Use your senses when maintaining PCs. With the computer on listen for any unusual noises, feel around the computer for excessive heat, and use your nose to detect for any burning smells. You'll smell most malfunctions before you see them. Also, be sure and check the monitor for proper display. Turn OFF the computer **immediately** if the CPU fails to boot-up or if any other problems occur. Ask your supervisor for advice before turning it on again.

**Diagnostics Testing** - The next step is to use diagnostic software to do a quick-test of the CPU, memory, display, keyboard, mouse, disk drive and printer problems.

There are lots of computer diagnostics programs available on the web. Some are free and some are not. The CSS course currently recommends QAWin32. However, this diagnostics software only works if Windows is installed and working on the computer under test. Other diagnostics programs are installed on a DOS boot disk inserted in the floppy drive. This is a nice feature

because the computer under test doesn't require a working operating system... a typical roadblock to computer troubleshooting. Either way, you'll have to follow the diagnostics operating instructions to test the CPU, memory, display, keyboard, mouse, disk drive, and printer.

**Floppy and CDROM Drive Cleaning** – To clean the floppy disk drive heads you'll need a wet cleaning diskette. It's important to note that cleaning diskettes are abrasive and will damage drive heads over time. Therefore, you should only clean the floppy drive heads if the drive is malfunctioning. Cleaning the floppy drive heads is sort of a last ditch solution to fixing a floppy drive problem, but sometimes it works.

Prepare the diskette and insert it into the floppy disk drive. Access the drive by trying to display a directory of the floppy drive. You can do this in Windows or DOS. The indicator light should come on for no more than 5 seconds. Immediately after 5 seconds, remove the disk from the drive.

The CDROM cleaning disk is not abrasive. Glued to the surface of the disk is a small brush that dusts the lens of the CDROM drive. A program on the CDROM adjusts the speed of the drive and cycles the pickup lens back and forth over the brush.

**Hard Disk Drive Maintenance** – Hard drive maintenance revolves around anti virus detection, surface checking, and disk optimization. Each operating system has different tools, but they all do essentially the same thing. There are also other disk utilities available from 3<sup>rd</sup> part vendors (Norton) that work as well. Regardless of the OS or tool you're using, you should always perform disk maintenance in this order.

1. Use updated anti-virus software and signature files to scan the hard disk drives for any viruses on executable files.
2. Backup important data files and information before doing anything that could damage the hard disk drive.
3. Use the surface checking utility (SCANDISK) to scan and repair the hard disk drive directories and media.
4. Use the disk optimization (DEFRAG) tool to organize the hard disk drive data so it operates more efficiently.

### *Workstation Setup and Adjustment*

The PMI isn't done until the computer's ready for use. The customer won't care how sharp a technician you are if you leave their workspace a mess. Therefore, the final step in the PC PMI is adjusting and setting up your workstation for the customer to use.

Adjust the monitor settings using the menu button to activate the on screen display. Continue pressing the menu button going through each of the functions while making the appropriate adjustments to the display. You should also take this opportunity to degauss the CRT. It's one of the options available in the monitor setting menu. Degaussing the screen gets rid of color splotching that's attributed to a magnetized screen.

**Tech Note:** The focus control is usually found on the back of the monitor. Typically, it's adjusted through an access hole in the monitor cabinet. Most of the time the hole is marked "FOCUS". To avoid electrical shock, this adjustment must be made with a non-metallic trimming tool.

Setup the workspace so the workstation components are neatly organized, easy to see, and use. You should also arrange the power and data cables so they're neat and orderly. After you

have the computer arranged and adjusted to the customer's liking, gather up your tools and wipe down the work area one last time.

Complete your work order and turn it into your supervisor.

**Review:**

Preventive Maintenance Inspections (PMIs) are performed to preserve the reliability of equipment. Through careful inspection, cleaning, and maintenance, computer workstations will perform better and last longer than those that are neglected. The PMI also allows technicians to detect serious problems before they occur and perhaps prevent system crashes and reduce equipment down time. Preventive maintenance is also periodic in nature. You should never go more than 30 days without performing a solid PMI on a personal computer.



# PC Preventive Maintenance Guide

## Technical Manual

### Exercise 1 – The PC PMI

#### Instructions:

Study the content carefully before attempting the questions listed below. Consider using other information sources as well. Periodicals, reference materials, and the Internet are great resources to find the answers to the technical problems you're going to face when servicing computers.

Name:	
Period:	
Date:	

Speaking of resources... Let's save some of our natural resources. Rather than printing out the entire lesson, print out only the worksheet. Study the lesson on-screen and then record your answers on this worksheet. When you're finished, return the worksheet to your supervisor for evaluation. Be sure to complete this assignment before moving onto the next.

#### Questions:

1. ✓ Research and develop a detailed definition for each of the following terms. Many words have multiple definitions... Some of which may have nothing to do with the field of Computer Service and Support. Make sure your definition falls within the context of this lesson. Refer to the list of Research Resources and Required Materials as well as other materials you feel are appropriate. Write your definitions on the reverse side of this worksheet or a separate piece of paper with each definition being two sentences or more.

- |               |                        |                         |
|---------------|------------------------|-------------------------|
| ✓ PMI         | ✓ Mechanical Mouse     | ✓ Computer Diagnostics  |
| ✓ Rattle Test | ✓ Mouse Retainer Clamp | ✓ Wet Cleaning Diskette |
| ✓ Solvent     | ✓ POST                 | ✓ Defragmentation       |

2. ✓ You should perform a solid personal computer PMI about every \_\_\_\_ days.

- A. 30
- B. 60
- C. 120
- D. 365

3. ✓ How often should you clean the floppy and CDROM drive heads?

- A. Once Each Month
- B. Twice a Year
- C. Only Upon Failure
- D. Once a Year

4. ✓ Search the MSDS – Search website for the Material Safety Data Sheet (MSDS) for Glass Plus manufactured by Reckitt Benckiser, Inc. What is the First Aid Measure for Eye Contact?

5. ✓ Search the MSDS – Search website for the Material Safety Data Sheet (MSDS) for Dust-Off Jumbo (Part #: DPSJB) manufactured by Falcon Safety Products. What are the potential health effects of this product?

6. ✓ Search the MSDS – Search website for the Material Safety Data Sheet (MSDS) for Alkaline Manganese Dioxide-Zinc Cylindrical (Alkaline) batteries manufactured by the Eveready Battery Company. What are the disposal instructions for the battery?
7. ✓ What is used to remove adhesive labels from a keyboard?
- A. Goo Gone
  - B. Acetone
  - C. Nitro Based Solvent
  - D. Spray Cleaner
8. ✓ How do you get rid of color splotching on a monitor screen?
- A. Slowly move a bar magnet across the monitor screen.
  - B. Use the degauss option in the monitor menu.
  - C. Select degauss in the diagnostics software.
  - D. Clean the CRT with spray cleaner.
9. ✓ In what order should you perform hard drive maintenance?
- A. Optimize, Anti-Virus, Surface Check, Backup
  - B. Backup, Optimize, Surface Check, Anti-Virus
  - C. Anti-Virus, Backup, Surface Check, Optimize
  - D. Surface Check, Backup, Anti-Virus, Optimize
10. ✓ You should never wear an ESD wrist strap when working with a...
- A. Memory Module
  - B. Monitor or CRT
  - C. Motherboard
  - D. Interface Card
11. ✓ The edge connector of a memory module or interface card are cleaned with...
- A. Spray detergent.
  - B. Clean, lint-free towel.
  - C. Contact cleaner.
  - D. Acetone.
12. ✓ The monitor glass should be cleaned...
- A. With the monitor off.
  - B. With the monitor on.
  - C. With an abrasive cleaner.
  - D. Once a year.
13. ✓ \_\_\_\_\_ or a vacuum can be used to remove dust and debris from a keyboard and other PC field replaceable modules (FRM).
- A. Spray Cleaner
  - B. Blowing with your mouth
  - C. Stiff Brushes
  - D. Compressed air
14. ✓ What is the last step in completing a PMI?
- A. Hard drive maintenance
  - B. Workstation setup
  - C. External cleaning
  - D. Completing the work order