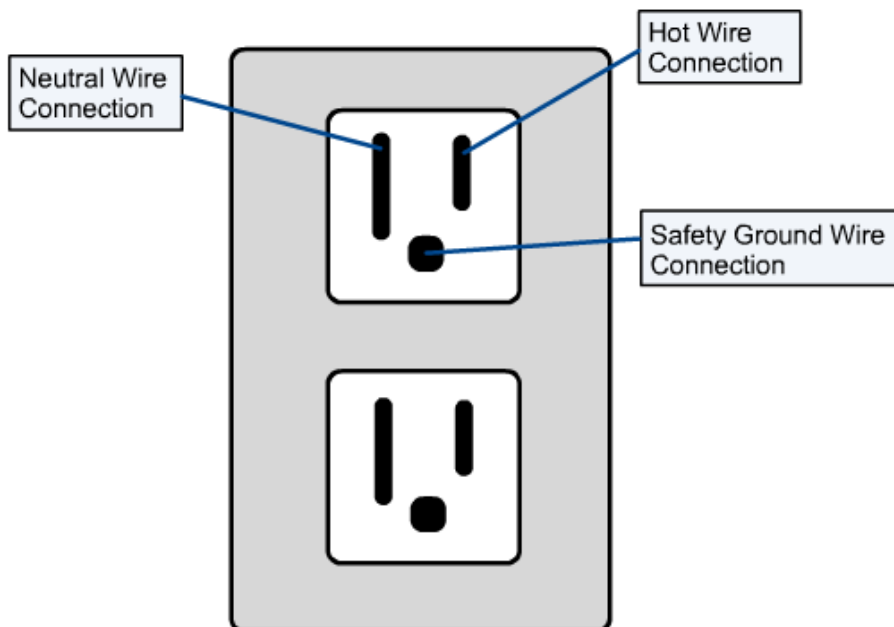


## **Basic Lab Safety**

Observe this list of guidelines to help create a safe, efficient work environment.

- The workspace should be large enough to accommodate the system unit, the technician's tools, the testing equipment, and the electrostatic discharge (ESD) prevention equipment. Near the workbench, power outlets should be available to accommodate the system unit power and the power needs of other electrical devices.
- The optimal level of humidity in the workspace should be between 20 percent and 50 percent to reduce the likelihood of ESD. The temperature of the workspace should also be controlled to avoid too much heat.
- The workbench should be a nonconductive surface, which is flat and cleanable.
- The workspace should be distant from areas of heavy electrical equipment or concentrations of electronics. For example, a workspace should not be near a building's heating, venting and air-conditioning (HVAC) or phone system controls.
- The workspace should be cleaned of dust. Dust can contaminate the workspace, causing premature damage to computer components. The work area should have a filtered air system to reduce dust and contaminants.
- Lighting should be adequate to see small details. Two different illumination forms are preferred, such as an adjustable lamp with a shade and fluorescent lighting.
- Temperatures should be maintained so they are consistent with the specifications of the components. Extreme variations of temperature can affect computer components.
- AC electrical current should be properly grounded. Following are the components of an outlet. Power outlets should be tested with an outlet tester for proper grounding.

### **AC Outlet**



## **Static Electricity**

Static electricity is the buildup of an electric charge resting on a surface. This buildup may end up zapping something that it can damage. A zap is known as an electrostatic discharge (ESD). ESD is the worst enemy of the fine electronics found in computer systems. This is why it has been discussed in almost every module in this course.

At least 3000 volts must be built up before a person can feel an ESD. If the discharge causes pain or makes a noise, then the charge was probably above 10,000 volts. Most computer chips run on less than five volts of electricity. A computer component could be damaged by less than 3000 volts of static buildup. Figure 1 summarizes some important guidelines for working with static electricity.

Do's and Don'ts of Static Electricity:

Do's	Don'ts
Work at an antistatic workstation equipped with tiled floors, a grounding strap, and a grounding mat.	Walk across the room then handle an electronic component without grounding yourself.
If possible, make sure the relative humidity is between 20 and 50 percent.	Touch pins or leads on a circuit board.

## **Workplace practises that help reduce ESD**

The workspace should be situated away from carpeted areas because carpets can cause the build up of electrostatic charges. If distance from carpeting is not possible, the carpeted surface could be covered with a plastic anti-static mat such as those commonly used under desk chairs. The use of ESD protection tools such as a wrist strap and a mat, which are commonly sold in kits, can largely eliminate this type of danger.

Always handle all components by their edges. Avoid touching pins, chips, or anything else made of metal. This practice will reduce the chance of producing a damaging electrostatic discharge.

## **Use of a Wrist Strap**

A wrist strap, is a device that is attached to the technician's wrist. This device is then clipped to the metal system chassis, on which work is being performed on. The wrist strap prevents ESD damage by channelling static electricity from the person to the ground.

### Wrist Strap



A wrist strap can only offer protection from ESD voltages carried on the body. ESD charges on clothing can still cause damage. Therefore, avoid making contact between electronic components and clothing. If static shocks are still being experienced in the workspace while working near a computer, try using a fabric softener or an anti-static spray on clothing. Be certain to spray clothing and not the computer. A wrist-grounding strap does not discharge electrostatic charges that have built up on hair. Take precautions to ensure that hair does not rub across any of the components.

ESD potential can also be reduced by not wearing clothing made of silk, polyester, or wool. These fabrics tend to build static

charges.

A wrist strap is never worn when working on a monitor or a computer power supply. Monitors and power supplies are considered replaceable components. Only highly skilled professionals will attempt to open and repair them. Components inside a monitor can hold a charge for a long time, even after the monitor has been unplugged from its external power source. The amount of voltage that a monitor can contain, even when turned off and unplugged, is enough to kill. The risk of contacting the dangerous electric charge in the monitor is heightened when a wrist strap is worn. The cathode ray tube (CRT) in the monitor is charged to 20,000 volts or more. This charge can remain for weeks after the monitor is turned off.

### Antistatic bags



Special packing materials are used with microchips and Printed Circuit Boards (PCBs). These packing materials range from special molded plastics and foams for microchips to antistatic bags for PCBs. Do not remove any component from special packaging until it is ready to be installed. Figure 1 shows an antistatic bag that can temporarily store parts and components when disassembling a computer for cleaning or other types of preventive maintenance.

Electronic components or circuit boards should be stored in shielded antistatic bags, which are easily recognized by a shielding characteristic. These bags usually have a silver color and a shiny, transparent appearance.

## Display Maintenance

### Monitor



hp p930 monitor

Since the display unit is the most visible piece of computer equipment, it should be kept clean for both appearance and functionality. The information in this section applies to both CRT and LCD screen types.

When cleaning a display, make sure the device is unplugged from the wall. Use a damp cloth with a mild detergent to wipe down the entire display unit and remove any dust buildup. Dampen another cloth with water to remove any cleaner residue on the surface of the monitor. Avoid using too much water to prevent drips. After cleaning the display, use a dry cloth to complete the job. Be careful when cleaning to avoid scratching the screen portion of the monitor.

After cleaning the monitor, make sure the power cord is plugged in securely.

**NOTE:** If liquid drips inside a CRT display while it is being cleaned, it is best to let it evaporate. Never open a CRT display.

## Keyboard

### Keys on the Keyboard



A keyboard receives more physical abuse than any other component of a computer system. Keyboards are also exposed to the environment, which allows dust to build up on the keyboard over time. Periodic cleaning of the keyboard will prolong the lifespan and prevent malfunction. The keys on a keyboard can be removed, as shown in Figure 1. This allows easy access to the areas where dust collects. A soft brush or cotton swab can be used to remove dirt from under the keys. Compressed air can be used to blow out dust from below the keys. The keyboard should be held vertically or in an inclined position while using the air to blow out the dirt and dust. This will prevent large dirt and dust particles from remaining stuck in the interior corners, springs, and foam material beneath the keys.