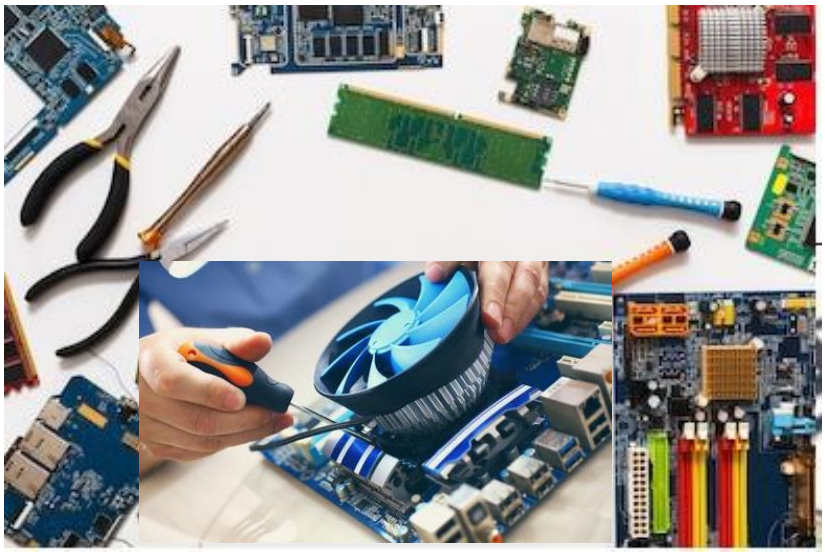
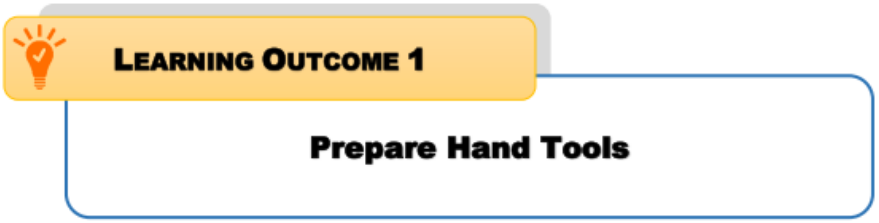
USING HAND TOOLS

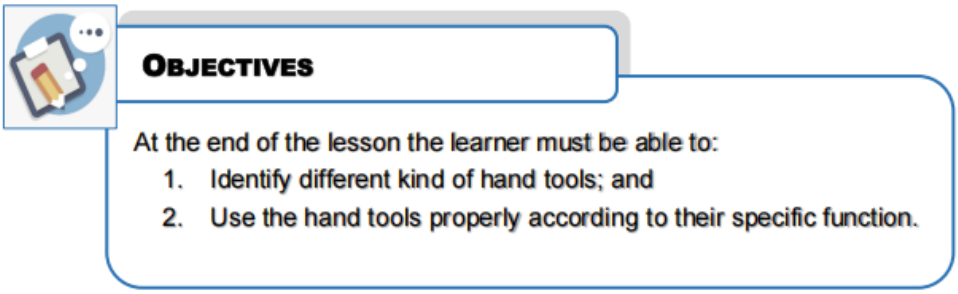


LEARNING OUTCOMES:

At the end of this lesson, you are expected to do the following:

LO 1. Prepare hand tools
LO 2: Use appropriate hand tools and test
LO 3: Maintain Hand Tools (Tools and Equipment Maintenance)





PREPARE HAND TOOLS

Proper tool selection

A tool is a handheld device that aids in accomplishing a task. Tools range from a traditional metal cutting part of a machine to an element of a computer program that activates and controls a particular function.

Preparing for the task to be undertaken includes proper tool selection.

1. How do you select the best tool for the job? First, know and understand in detail the scope of work to be accomplished, second, plan for the scope taking into account the sequence of tasks.

2. Selecting the best tool for each task requires training in the proper use of the tools, field experience in their safe use, and following the manufacturer's guidance and instructions for that specific tool.

3. When obtaining the tool all the associated tooling and consumable parts, as recommended by the manufacturer, must be included. In addition, related consumable parts must also be selected and used according to their manufacturer's instructions.

Safe Use of tools

Once selected, use the tool for the purpose for which it was designed. Not all tools come with detailed instructions, but there are those that do spell out the safety

—Do's and Don'ts‖ for your safety. If there are set-up/use options, operator judgment must always be based on what is the safest way to use the tool.

Environmental Safety and Health Program requires the following:

• All tools be kept in good condition with regular maintenance
• The right tool be used for the job
• Each tool be examined before use and damaged or defective tools not to be used
• Tools be operated according to manufacturer's instructions
• The right protective equipment for the tool and activity be used

HARDWARE TOOLS

To complete hardware repairs, it is important to have a toolkit that should contain all of the necessary tools. As you gain experience, you will learn which tools to have available for different types of jobs. Hardware tools are grouped into these four categories:

- Electro-Static Discharge (ESD) tools
- Hand tools
- Cleaning tools
- Diagnostic tools

Electro-Static Discharge (ESD) Tools
Static electricity is easily generated by friction on carpets, tile flooring, clothing, hair, fabric, and etc. The friction of moving air alone will charge suspended particles and cause the build-up of static electrical charges on people and objects in the environment. Grounded antistatic work mats used with antistatic wrist straps provide the most basic means for the controlled discharge of electrostatic electricity.

Examples of ESD Tools:

	Anti-static wrist strap - Used to prevent ESD damage to computer equipment.
	Anti-static mat - Used to stand on or place hardware on to prevent static electricity from building up.

Hand Tools

A hand tool is a device for performing work on a material or a physical system using only hands. The hand tools can be manually used employing force, or electrically powered, using electrical current.

Examples of Hand Tools:

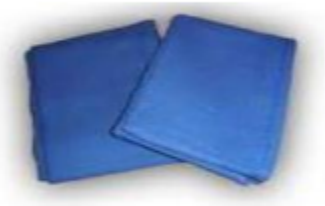
	Flat head screwdriver - Used to loosen or tighten slotted screws.
	Philips head screwdriver - used to loosen or tighten crosshead screws.
	Torx screwdriver - used to loosen or tighten screws that have a star-like depression on the top, a feature that is mainly found on laptop.
	Hex driver - Sometimes called a nut driver, is used to tighten nuts in the same way that a screwdriver tightens screws.
	Long nose plier - Used for holding and bending of wire.
	Wire cutter - Used to strip and cut wires.

	Tweezers - Used to manipulate small parts.
	Part retriever - Used to retrieve parts from location that are too small for your hand to fit.
	Flashlight - Used to light up areas that you cannot see well.
	Crimping Tool - Used to crimp RJ45 to UTP cable. It also have a cutting edge.
	Soldering Iron - Is used to join two or more metal conductors with the support of soldering lead melted around it.

Cleaning Tools

Having the appropriate cleaning tools is essential when maintaining or repairing computers. Using these tools ensures that computer components are not damaged during cleaning.

Examples:

	**Lint-free cloth** - Used to clean different computer components without scratching or leaving debris.

	Compressed air - Used to blow away dust and debris from different computer parts without touching the components.
	Cable ties - Used to bundle cables neatly inside and outside of a computer.
	Parts organize - Used to hold screw, jumpers, fasteners and other small parts and prevents them from getting mixed together.
	Brush - Used for cleaning dust.

Diagnostic Tools

Computers are easier to use and more dependable with each new generation of hardware and operating system update, but that doesn't mean they're problem-free. Here's the most popular tools for diagnosing your computer problems:

	Multitester - is an electronic measuring instrument use to measure voltage, current and resistance.

	Loopback Adapter - used to test the functionality of computer ports.
	LAN Tester - is used for testing Ethernet cables for faults or missing pair connections.

APPROPRIATE HAND TOOLS AND TEST EQUIPMENT

Proper Use of ESD Tools

The purpose of an antistatic wrist strap is to equalize the electrical charge between you and the equipment. The antistatic wrist strap is a conductor that connects your body to the equipment that you are working on.
When static electricity builds up in your body, the connection made by the wrist strap to the equipment, or ground, channels the electricity through the wire that connects the strap

The wrist strap has two parts and is easy to wear:

1. Wrap the strap around your wrist and secure it using the snap or Velcro. The metal on
the back of the wrist strap must remain in contact with your skin at all times.

2. Snap the connector at the end of the wire to the wrist strap, and connect the other end either to the equipment or to the same grounding point that the antistatic mat is connected to. The metal skeleton of the case is a good place to connect the wire. When connecting the wire to equipment that you are working on, choose an unpainted

metal surface. A painted surface does not conduct the electricity as well as unpainted metal. An antistatic mat is slightly conductive. It works by drawing static electricity away from a component and transferring it safely from equipment to a grounding point:

1. Lay the mat on the workspace next to or under the computer case.

2. Clip the mat to the case to provide a grounded surface on which you can place parts as you remove them from the system. Reducing the potential for ESD reduces the likelihood of damage to delicate circuits or components.

PROPER USE OF HAND TOOLS

A technician needs to be able to properly use each tool in the toolkit. This topic covers many of the various hand tools used when repairing computers.

Screws

Match each screw with the proper screwdriver. Place the tip of the screwdriver on the head of the screw. Turn the screwdriver clockwise to tighten the screw and counter clockwise to loosen the screw. Screws can become stripped if you over-tighten them with a screwdriver. A stripped screw, may get stuck in the screw hole, or it may not tighten firmly. Discard stripped screws.

Flat head screwdriver

Use a flat head screwdriver when you are working with a slotted screw. Do not use a flat head screwdriver to remove a Phillips head screw. Never use a screwdriver as a pry bar. If you cannot remove a component, check to see if there is a clip or latch that is securing the component in place.

CAUTION*: If excessive force is needed to remove or add a component, something is probably wrong. Take a second look to make sure that you have not missed a screw or a locking clip that is holding the component in place. Refer to the device manual or diagram or additional information.*

Phillips head screwdriver

Use a Phillips head screwdriver with crosshead screws. Do not use this type of screwdriver to puncture anything. This will damage the head of the screwdriver.

Hex driver

Use a hex driver to loosen and tighten bolts that have a hexagonal (six-sided) head. Hex bolts should not be over-tightened because the threads of the bolts can be stripped. Do not use a hex driver that is too large for the bolt that you are using.

CAUTION: *Some tools are magnetized. When working around electronic devices, be sure that the tools you are using have not been magnetized. Magnetic fields can be harmful to data stored on magnetic media. Test your tool by touching the tool with a screw. If the screw is attracted to the tool, do not use the tool.*

Part retriever, Needle-nose pliers, or tweezers

The part retriever, needle-nose pliers, and tweezers can be used to place and retrieve parts that may be hard to reach with your fingers. Do not scratch or hit any components when using these tools.

CAUTION: *Pencils should not be used inside the computer to change the setting of switches or to pry off jumpers. The pencil lead can act as a conductor and may damage the computer components.*

PROPER USE OF CLEANING MATERIALS

Keeping computers clean inside and out is a vital part of a maintenance program. Dirt can cause problems with the physical operation of fans, buttons, and other mechanical components. On electrical components, an excessive build up of dust will act like an insulator and trap the heat. This insulation will impair the ability of heat sinks and cooling fans to keep components cool, causing chips and circuits to overheat and fail.

CAUTION*: When compressed air is used to clean inside the computer, the air should be blown around the components with a minimum distance of four inches from the nozzle. The power supply and the fan should be cleaned from the back of the case.*

CAUTION: *Before cleaning any device, turn it off and unplug the device from the power source.*

Computer Cases and Monitors

Clean computer cases and the outside of monitors with a mild cleaning solution on a damp, lint-free cloth. Mix one drop of dishwashing liquid with four ounces of water to create the cleaning solution. If any water drips inside the case, allow enough time for the liquid to dry before powering on the computer.

LCD Screens

Do not use ammoniated glass cleaners or any other solution on an LCD screen, unless the cleaner is specifically designed for the purpose. Harsh chemicals will damage the coating on the screen. There is no glass protecting these screens, so be gentle when cleaning them and do not press firmly on the screen.

CRT Screens

To clean the screens of CRT monitors, dampen a soft, clean, lint-free cloth with distilled water and wipe the screen from top to bottom. Then use a soft, dry cloth to wipe the screen and remove any streaking after you have cleaned the monitor.

Clean dusty components with a can of compressed air. Compressed air does not cause electrostatic build-up on components. Make sure that you are in a well-ventilated area 25 before blowing the dust out of the computer. A best practice is to wear a dust mask to make sure that you do not breathe in the dust particles. Blow out the dust using short bursts from the can. Never tip the can or use the compressed air can upside down. Do not allow the fan blades to spin from the force of the compressed air. Hold the fan in place. Fan motors can be ruined from spinning when the motor is not turned on.

Component Contacts

Clean the contacts on components with isopropyl alcohol. Do not use rubbing alcohol. Rubbing alcohol contains impurities that can damage contacts. Make sure that the contacts do not collect any lint from the cloth or cotton swab. Blow any lint off the contacts with compressed air before reinstallation.

Keyboard

Clean a desktop keyboard with compressed air or a small, hand-held vacuum cleaner with a brush attachment.

CAUTION: *Never use a standard vacuum cleaner inside a computer case. The plastic*

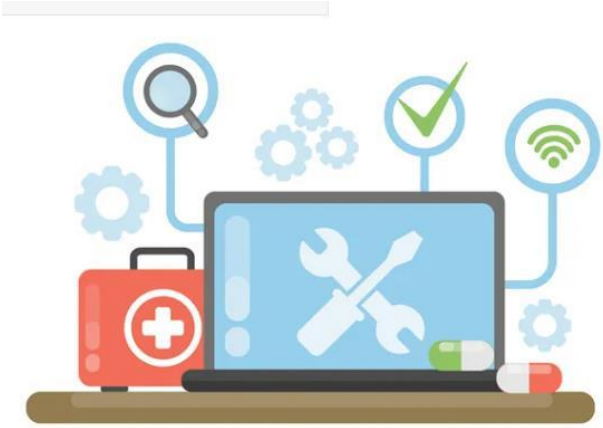
parts of the vacuum cleaner can build up static electricity and discharge to the components. Use only a vacuum approved for electronic components.

Mouse

Use glass cleaner and a soft cloth to clean the outside of the mouse. Do not spray glass cleaner directly on the mouse. If cleaning a ball mouse, you can remove the ball and clean it with glass cleaner and a soft cloth. Wipe the rollers clean inside the mouse with the same cloth. Do not spray any liquids inside the mouse.

MAINTAIN HAND TOOLS (TOOLS AND EQUIPMENT MAINTENANCE)

All tools and equipment must be properly maintained so that workers are not endangered. Regulations require inspections of tools, machines and equipment before use. Preventive maintenance is the systematic care and protection of tools, equipment and machines in order to keep them in a safe, usable condition, limit downtime and extend productivity. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury. The successful maintenance program is:



- well organized and scheduled,
- controls hazards,
- defines operational procedures, and
- trains key personnel.

General requirements for tools and equipment maintenance include:

- ✓ Obtaining a copy of the maintenance schedule recommended by the manufacturer.
- ✓ Ensuring that maintenance is performed as required
- ✓ Ensuring that the person(s) performing the maintenance are competent (e.g. licensed mechanic)
- ✓ Retaining records of maintenance/service conducted.
- ✓ Specifying who is responsible for overseeing equipment maintenance and where the records are kept.
- ✓ Set up a system for removal and tagging of damaged or defective tools and equipment.

PROPER STORAGE OF TOOLS, PARTS, AND EQUIPMENT

To ensure that tools and equipment remain in good condition and last for a long time, store them properly. Properly stored tools and equipment will be easy to find when needed and are less likely to be lost.

Good practices include:

- ✓ Parts should be properly stored and can be labeled (Figure 1).
- ✓ Use bins for storing small parts.
- ✓ Consider making an individual (or individuals) responsible for the good maintenance tools and parts.

Benefits:

- ➢ Tools and parts are kept in good condition and are easy to find
- ➢ Costs are reduced.
- ➢ Productivity is increased because time is not wasted looking for tools, parts and equipment.
- ➢ Workshop staff develop a sense of responsibility and pride in their work.

Note:

Most manufacturers can provide maintenance schedules for their equipment. Large companies typically have a comprehensive maintenance program due to the capital investment and/or leasing agreements. Smaller companies may lease equipment and maintenance services may be included in the leasing agreement.