

Tool ID and Use Guide

Technical Manual



Introduction:

The PC Technician Toolkit is the computer technician's bag of tricks when it comes to computer service and support. You'll not only need to know the names of these tools, you'll need to know how to use them safely and care for them as well. It would certainly help you to print the Tool Inventory Checklist and conduct an inventory as you go along.

The toolkit pictured above is the deluxe version. You may not use all of these tools right away. However, you will use them all sooner or later. You might also have a different toolkit than the one that's shown above. Your toolkit might have slightly different tools or perhaps it doesn't have as many tools. That's all right. This lesson will introduce you to all the general tools used to perform maintenance and repair of computers and printers.

The PC Technician Toolkit can be divided into five types of tools:

- Cleaning Tools and Supplies
- Pliers
- Drivers
- Wrenches
- Miscellaneous and Special Tools

Words and Terms You Should Know

Aerosol Propellant
Diagnostics
Wire Gauge

Spline
Auto-Range
Box-End Wrench
Tang

Potentiometer
Screwdriver Blade
Jaw

CLEANING TOOLS AND SUPPLIES

As a computer technician, you'll be doing a lot of cleaning. The following tools and materials are important because you can cause significant damage to a computer or printer if you use incorrect cleaners or use cleaning tools incorrectly.

Compressed Air - Whether it's called canned air, duster, or compressed air it's all the same. This important tool is pressurized air in a aerosol can and is used to clean the dust away from electronic equipment. There are a few precautions to follow when using *compressed air*.



- Never direct the nozzle at yourself or anyone else. The pressure in these cans is quite high and could inject air under the skin and into the blood stream. Air in the bloodstream can cause death.
- Keep the can upright at all times. Tilting the can will cause the propellant to spray out of the nozzle. The propellant can stain plastic or painted surfaces and freezes skin.
- Do not breath in the air from aerosol cans. Inhaling the propellant can cause brain damage.
- Compressed air is expensive and should not be wasted.

Here's how to properly use compressed air:

1. Use the soft bristled bush to knock the dust loose before using compressed air.
2. Holding the can upright, use short bursts of air moving the nozzle in a sweeping motion.
3. Use the extender tube when you need to direct the stream into a confined area.

Cleaning Swabs - Cleaning swabs are used to clean difficult to clean areas such as vents, corners, and seams in cabinetry. Swabs can also be used to clean in between the keys on keyboards and even the head on floppy disk drives. Although cotton swabs on paper sticks are adequate, swabs with wooden sticks are stronger and reach farther into hard to reach places. To use swabs, apply spray detergent to the head



of the swab and draw or push the swab through the area being cleaned. Use a wipe to remove the dirt and excess cleaning solution.

Hard Bristled Brush - The *hard bristled brush* is used to scrub difficult to clean areas such as vents, corners, and seams in cabinetry. These brushes can also be used to clean fan blades and hard to clean areas on keyboards. Use a brush with a width of around 1/2 inch. Spraying cleaner

on this brush improves cleaning action. To use the hard bristled brush, apply spray detergent to the bristles and sweep the brush through the area being cleaned. Use a wipe to remove the dirt and excess cleaning solution.



Soft Bristled Brush - The *soft bristled brush* looks a lot like a paintbrush... That's because it is a paintbrush. It's used as a dusting tool for computer components such as keyboards, air vents, fan openings, and circuit boards. Select a brush with soft and pliable bristles. The width of the brush should be around 1 inch and should be kept dry. Don't spray cleaner on this brush as it curls the bristles making it difficult to use. To use the soft bristled brush, lightly sweep the brush between the keys on a keyboard, chassis seams, and vents on the computer or monitor. The idea is to use the brush to knock the dirt loose so it can be easily blown away with compressed air. Clean the brush by vigorously shaking the brush end.



Spray Cleaner - Multipurpose *spray cleaner* is used to clean everything from the keyboard to the monitor screen. It's a general-use water based detergent commonly found in any supermarket. Spray cleaner is mostly water and water is a conductor of electricity. You should never... Never... NEVER spray detergent directly onto any electronic device or equipment. The solution can short-out the electrical circuitry, damage the equipment, and harm you. Instead, spray the cleaner into a *wipe, brush, or swab* and use that to clean the surfaces, seams, and openings of the equipment.



Wipe Cloths - *Wipe cloths* are important cleaning tools and should be soft and absorbent. They can be made of either paper or cloth and are used to clean the monitor, chassis, and keyboard. They're even used to clean the computer table. It's important to remember that computers are electronic devices. It is dangerous to spray cleaner directly on the computer chassis, keyboard, and monitor. Solution seeping through the case can cause an electrical short damaging the equipment and cause you personal injury. When cleaning electronic equipment, spray the detergent on the wipe cloth and use the damp wipe to clean the device. Always wipe the equipment dry to complete the job.



Floppy Drive Cleaning Disk – One of the simplest ways of cleaning the floppy disk drive heads is to use a *cleaning diskette*. These devices are simple to operate and don't require the computer be opened to work. The cleaning disk comes in two basic styles. The first uses a liquid that is squirted onto the disk as the cleaning agent and the second type is totally dry. Don't use the dry cleaning-disk system. Always use the wet system with alcohol or freon because the dry disk can damage the heads if improperly used or used too often.

Squirt about five to ten drops of the cleaning solution on the fiber part of the diskette. Insert the diskette into the drive and access the drive using the operating system of the computer. The drive light should come on to indicate the drive heads are engaged. Remove the cleaning disk after five seconds. Be sure to put the diskette back into its holder immediately. The wet surface will attract dust and dirt that can damage a drive heads the next time the cleaning disk is used. You should clean the floppy disk drive heads about once a year.

PLIERS

One of the important considerations about the use of pliers is that you make the correct selection for the job to be done. If you use the wrong type of pliers, you may injure yourself and almost certainly damage your work. A pliers that is too large can damage your work and using a pliers too small will damage the tool. Pliers are also an essential wiring tool. There are many different kinds of pliers.



Groove Joint Pliers - Although this tool is called a pliers, it performs like an *adjustable wrench*. The *groove joint pliers* is a special purpose pliers originally used to grip hex-head bolts or hex-nuts. Since the pliers jaws are parallel and can be adjusted to various opening widths, this tool can be used to secured and turn medium to very large nuts and bolts. However, It is not the preferred tool to use for nuts and bolts. It's only used when an adjustable, box-end, open-end, or socket wrench can't be used. The opening size can be changed by slipping the pliers from one groove joint to another. The jaws also have teeth for gripping.

Wire Strippers - This particular *wire stripper* is the most basic model. Although this tool is relatively inexpensive, using it takes a great deal of skill to avoid nicking the conductor under the wire insulation.

To use this tool, press the blades together until they cut through the insulation of the wire. You then pull the tool away from the wire, thereby removing the insulation. When using this kind of wire stripper, be careful not to press the blades together more than is needed to cut through the insulation. Otherwise, the blades may cut into the conductor and weaken it. The nut and bolt can be adjusted to keep you from nicking the conductor while you're stripping off wire insulation. Simply loosen and slide the stop to the appropriate point where the blades only cut through the insulation. Then tighten the bolt. You'll have to readjust the stop for other gauges of wire.



Hemostats - *Hemostats* are used for holding or handling small parts. Shapes and sizes vary, depending on their use. They are normally made from steel and have a locking device to lock the jaws in the closed position. The tips may be curved, straight, or at various angles to the main body. Hemostats are used to handle parts that are so small that the fingers could not possibly manipulate them. They are also used to handle small parts that would be damaged if allowed to come in contact with the perspiration of the hand. A fine sense of touch is needed to handle very small parts. Too little pressure causes the part to slip from the hemostat. Too much pressure causes the tips of the hemostat to damage the part or to bow outward. Remember that hemostats are actually delicate pliers made for holding, manipulating, and bending tiny parts. Don't use hemostats for

pliers or pliers for hemostats. The tool, the part, or both may be damaged. The jaws of the hemostat must be parallel when closed on a part. If the jaws are not properly aligned, shaped, or surfaced, condition them before use. A small amount of bending may be necessary to return the hemostat to proper operation. Periodically clean the tips of the hemostat with cleaning solution.

Needle Nose Pliers - The pliers shown here are *needle nose pliers*. Sometimes called *longnose pliers*, this tool is used most for gripping



and bending small wires. They often have wire-cutting jaws to cut small gauge wires. The relatively weak jaws of these pliers may be bent out of shape if too much pressure is used to grip objects. Common sizes for longnose pliers are 5 and 6 inches. Because of the shape of the nose, or gripping jaw, longnose pliers are very useful for bending wires into a loop. This is often done when fastening the end of a wire to a screw terminal or solder lug. They can also be used to grasp small parts in hard to reach places.

Chain Nose Pliers - The pliers shown here are *chain nose pliers*. This pliers are stronger than *longnose* or *needle nose pliers* and are used for gripping and bending heavier wire and metal. The insulated handles afford added protection from electrocution.

You must use good judgment when selecting pliers for a job. You must make sure the pliers are large enough to do the job. Pliers are made in a wide range of sizes to avoid overstraining and breaking the tool. Not only must you select the proper size tool, you must also select the right tool for the job. Making the right decision will help you work faster, safer, and protect your work. The care of pliers usually involves cleaning, pivot-point maintenance, and sharpening the cutting edges. Pliers require an occasional oiling at the pivot points or joint.



Mini Diagonal Cutters

Diagonal-cutting pliers are only for cutting copper wires. They should never be used as a gripping tool, wire stripper, or to notch sheet metal. This can damage the cutting jaws. The jaws can also be damaged if they are used to cut hardened iron or steel wires. Diagonal-cutters are not good wire strippers because there's no way to keep from nicking the wire's conductor. As with other kinds of pliers, diagonal-cutting pliers are sized according to their length. The diagonal-cutting pliers pictured here are used for wires 18 gauge and smaller. Cutting thicker wires will damage the jaws.

DRIVERS

Drivers are made in various shapes and lengths and are designed to perform specific jobs. The size of the screwdriver is indicated by the length of the blade and the size of the tip. The size and shape of the blade tips vary from narrow parallel-sided tips to wide, tapered tips. Some screwdrivers have special tips for cross-slotted, recessed screws or bolts, and clutch-bit screws. Some screwdrivers are even provided with a ratchet in the handle to make them easier to use.

Always use a driver that fits the screw slot exactly. A poor fitting driver can damage the screw and driver, slip off the screw, and cause personal injury. If a tight screw with a damaged slot can be backed out partially, it is possible to remove it completely by turning it with a pair of pliers. When a driver becomes chipped, or the gripping edges become rounded, or when other damage occurs so that it doesn't fit the screw, don't use it. Remember that drivers are used for one purpose only - to turn screws. They must never be used for any other task.

Slotted Screwdriver Set - The *slotted screwdrivers* shown here are also called *common screwdrivers*. Although these screwdrivers use an interchangeable handle, most common screwdrivers are made of a round steel shaft anchored in a wood or plastic handle. The tip of a common screwdriver comes in various shapes and sizes. Some tips have parallel sides while others are tapered. The size of the common screwdriver is determined by the width and thickness of the tip and the length of the blade. They're designed to work with slotted-head screws only. Since slotted head screws come in hundreds of shapes and sizes, selecting the correct screwdriver can sometimes be difficult. The general rule of thumb is to select a screwdriver that fits snugly into the head of the screw. Common screwdrivers also have different length



blades ranging from 1 inch to 8 inches. Worn slotted screwdrivers must be reground or filed to the right shape. The sides must be parallel to keep the tool from lifting from the screw slot, and the tip must be square, at right angles to the blade.

Phillips Screwdriver Set - The screwdrivers pictured here are *Phillips screwdrivers* that use an interchangeable handle. The tip of a Phillips screwdriver is shaped like a cross so that it fits into Phillips-head screws. Phillips-head screws have two slots that cross at the center of the screw's head. These screwdrivers are made with four different sized tips: Size 1 will fit #4 and smaller size Phillips screws; size 2 will fit #5 to #9 inclusive; size 3 will fit #10 to #16 inclusive; and size four will fit #18 and larger size Phillips-head screws. Sizes 1 to 3 are used with this particular. Phillips screwdrivers also have different length blades ranging from 1 inch to 8 inches. Phillips screwdrivers normally aren't repairable when the tips become worn.



Nutdrivers - The *nutdriver* has a shaft and handle like a screwdriver and a *hexagonal socket* tip for use with hexagonal-head screws and nuts. The size of the nutdriver is given by the distance across the flats, or any two parallel sides of its socket. The nutdriver set shown here has a single handle with interchangeable sockets. Nut drivers are sometimes called *spin-sockets* and are used to secure *hex-nuts* and *hex-head bolts*. It's important to select the correct sized nutdriver for the job. The socket should fit snugly over the head of the bolt or nut. Too loose a fit could cause damage to the nut, bolt, or nutdriver. Some tool manufacturers color-code the handles for easy size identification.



Handle Color	Size	
	Inches	Millimeters
Black	3/16	4.76
Brown	7/32	5.55
Red	1/4	6.35
Orange	9/32	7.14
Amber	5/16	7.94
Green	11/32	8.73
Blue	3/8	9.53

Common Screwdriver - 3/32" Blade - The *slotted screwdriver* shown here is also called a *common screwdriver*. Like all screwdrivers, this driver is made of a round steel shaft anchored in a plastic handle. The width of the tip is 3/32" and is used to turn small common screws.



Phillips Screwdriver Size 0 - The screwdriver pictured here is a *Phillips screwdriver*. The tip of a Phillips screwdriver is shaped like a cross so that it fits into Phillips-head screws. Phillips-head screws have two slots that cross at the center of the screw's head. The size of Phillips screwdrivers is indicated by numbers. This particular driver is a #0 and is used for the smallest of Phillips head screws.

Remember...Always use a screwdriver that fits the screw slot exactly. A poor fitting screwdriver can damage the screw and screwdriver, slip off the screw, and cause personal injury. If a tight screw with a damaged slot can be backed out partially, it is possible to remove it completely by turning it with a pair of pliers. When a screwdriver becomes chipped...or the edges become rounded... or when other damage occurs so that it doesn't fit the screw slot, don't use it. Phillips screwdrivers normally aren't repairable. Remember that screwdrivers are used for one purpose only - to turn screws. They must never be used for any other task.

Aligner - Aligners are tools used by electronics technicians to adjust IF cans, RF coils, and potentiometers. These devices are normally adjusted while power is applied to the equipment. To prevent electrocution, the shaft of the *aligner* is made of a nonmetallic material such as plastic or nylon. This particular aligner features a hexagonal tip. The tip of the aligning tool is made of plastic so the tool doesn't disturb the magnetic fields in coils. Used like a screwdriver, this tool is used to adjust coil slugs found in electronic equipment. To make adjustments, you insert the tip of the aligner into the component and gently turn the aligner clockwise or counterclockwise to get the proper results.



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Potentiometer Trimmer - Trimmers are tools used by electronics technicians to adjust circuit board mounted trimming potentiometers. These potentiometers are normally adjusted while power is applied to the equipment. To prevent electrocution, the shaft of the *potentiometer trimmer* is made of a nonmetallic material such as plastic or nylon. The tip of the trimming tool is sometimes made of plastic, but more often it's



a small piece of aluminum. It's really a common screwdriver used to adjust potentiometers found in electronic equipment. To make adjustments, you insert the tip of the trimmer into the potentiometer and gently turn the trimmer clockwise or counterclockwise to get the proper results.

Screw Starter - This tool is used to start both common and Phillips head screws. The common and Phillips tips on the screw starter are spring loaded. After twisting the tip you insert the screw and then release the tip to secure the screw on the starter. After starting the screw, the tool releases the screw and then resets automatically. Some *screw starters* include a magnetic tip to help you retrieve nuts and screws dropped in hard to reach places.

start both common and Phillips



WRENCHES

One of the important considerations about the use of wrenches is that you make the correct selection for the job to be done. If you use the wrong type of wrench, you may injure yourself and almost certainly damage your work. A wrench that is too large can damage your work and using a wrench too small will damage the wrench.

Ignition Wrench - Although this tool is called a wrench, it performs more like a pair of pliers. The *ignition wrench* is a special purpose pliers originally used to make adjustments to distributors on automobile engines. Since the pliers jaws are parallel and can be adjusted to various opening widths, this tool can be used to secured and turn small nuts and bolts. However, It is not the preferred tool to use for nuts and bolts. It's only used when an adjustable, box-end, open-end, or socket wrench can't be used. The opening size can be changed by slipping the pliers from one joint to another. That's why this tool is sometimes called a *slip-joint pliers*. The jaws also have teeth for gripping.



Adjustable Wrench - *Adjustable wrenches* differ from fixed-end wrenches in that the size of the opening is adjustable to fit more than one size nut or bolt. The adjustable wrench should be used when the correct size fixed-end wrench is not available. The *single open-end wrench* supplied with this kit is similar in shape to the fixed-end, nonadjustable open-end wrench, but has one adjustable jaw and one stationary jaw. This adjustable-end wrench has up to a 1/2" jaw opening and is 6 Inches long. A knurled nut is rotated to bring the movable jaw up to fit the nut or bolt head.

with this type of spline socket. Like the hex key wrench the Torx wrench is L-shaped, made of tool steel, and has a spline tip to fit these types of screws. The end of the Torx key is inserted into the opening in the screw cap and turned. The L-shape of the wrench gives you leverage to turn the screw

Torx Set - Some setscrews and hollow-headed capscrews are designed to be tamper resistant. The *Torx head* cap screw is a spline headed screw used for such a purpose. The Torx wrench fits screws



Hex Key Set - Most setscrews and hollow-headed capscrews have a hexagon (six sided) socket. The commonly known *hex key* (sometimes called an *Allen*) wrench is L-shaped, made of tool steel, and has a hexagonal or square section to fit these screws. The end of the hex key is inserted into the opening in the screw cap and turned. The L-shape of the wrench gives you leverage to turn the screw.

MISCELLANEOUS AND SPECIAL TOOLS

Multimeter - The portable *digital multimeter* is designed to measure voltage (volts), resistance (ohms), and current (milliamperes). It's features include a power switch, function selector for desired measurement, negative-sign indicator when measuring dc volts or dc milliamperes, and digital readout by LCD (liquid crystal display) numerals, automatic positioning decimals, and auto ranging display. The meter leads are color coded... Red for positive and black for negative. The digital multimeter is powered by disposable batteries.

Digital meter circuits change or convert the analog quantity into digital form. The device that does this called analog-to-digital converter, or ADC. Digital meters are rapidly replacing many of the analog meters previously used to measure electrical quantities. There are three main reasons for this. First, the digital meter is easy to read. Second, the measurements are accurate. Third, the cost of purchasing a digital meter is becoming more competitive with the cost of an analog meter.

All meters are delicate instruments. They must be used with care to keep from damaging them mechanically or electrically. You must also choose a voltmeter or an ammeter with the right range. This

means that the instrument must be able to safely handle the highest voltage or largest current being tested. You should always learn how to operate any meter before trying to use it. One of the best ways to do this is to read the operation and applications manual for the meter very carefully. This manual provides detailed instructions on how to use and read the meter safely.

Voltmeters and ammeters are connected to energized circuits or in circuits to which a voltage will be applied. It is very important, therefore, to follow the appropriate safety rules while using them. Voltmeters and ammeters are often connected to a circuit with clips or screw terminals. It is always safer to turn off the power supply before making these connections. The circuit can then be turned on to make the measurement to connect a meter to a circuit.



Using the Voltmeter - A voltmeter is always connected to the two points across a device or circuit under test. A dc voltmeter is a polarized instrument. This means that it must be connected to a circuit in the correct polarity. That means + (red) to + and - (black) to -. If this is not done, the indication on the meter will be a negative voltage. An ac voltmeter can be connected across two points under test without regard to polarity.

Using the Ammeter - The ammeter is normally connected in series with the conductors and device being tested. It may be permanently damaged if it is connected across an energy source or into a circuit with too much current. A dc ammeter must be connected into a circuit with the right polarity. If not, the current reading will be displayed as a negative reading. An ac ammeter can be connected into a circuit without regard to polarity.

Using the Ohmmeter - An ohmmeter is connected in parallel to the terminals of the device or circuit in order to measure its resistance. When using an ohmmeter, always be sure there is now voltage applied to the device or circuit under test. The meter might be damaged if it is connected across two points... even if a low voltage is present. Do not let the fingers of both hands touch the tips of the test prods while measuring resistance. If you do so, the ohmmeter will combine the resistance of your body and the circuit being tested. Be very especially careful of this in measuring high values of resistance.

Continuity Test - In addition to measuring resistance, an ohmmeter is used to make continuity tests. The continuity test shows whether or not there is a continuous electronic path from one test point to another. Continuity tests are very useful for checking conductors hidden in wires, fuses, and other devices in which the complete path cannot be seen. In addition, continuity tests are commonly used for checking switches, transformers, and relay coils. When making a continuity test, the ohmmeters is normally set to the R x 1 range. It is then connected to the terminals of the device or to the point of the circuit being tested. If the readout stays at an infinite reading... there's no continuity meaning the circuit is open. If the reading is zero ohms, there is said to be direct continuity between the points under test.

Diagnostics Software - This software locates most problems in all the major components of personal computers. *Diagnostics software* should be flexible enough to allow batch testing or loop testing as well as allow you to change the parameters of each test. Diagnostics software can run off of floppy disk, CD-ROM, local hard disk drive, or a network drive. Good diagnostic software tests the CPU, memory, hard disk drive, floppy disk drive, and CD-ROM. Excellent software will also test the COM and parallel ports, sound card, monitor, and keyboard. *Loop-back plugs* are needed to adequately test the COM, parallel, and sound card ports. Diagnostic software also includes a burn-in process that thoroughly exercises new computers. This is key, because most computer problems occur with the first 24 hours of operation of new computers. Diagnostics testing is part of a strong periodic maintenance program as well as an important tool used in troubleshooting computer problems.



Parts Box - The *parts box* is used to temporarily store parts while you're repairing equipment. As you remove screws, nuts, and bolts, place them in the parts box so you know where they are. Never place these items loose on the workbench. They can accidentally be pushed from the table top on to the floor and be lost. Using the parts box helps you keep track of important parts and prevents you from having "extra" parts or not enough parts at the end of a job. At the end of work day, put the parts in a *zip lock bag* and store it with the equipment still under repair. Put the empty parts box back in the tool kit.



Zip Lock Bag - The *zip lock bag* is used to temporarily store parts while you're repairing equipment. As you remove screws, nuts, and bolts, place them in the zip lock bag so you know where they are. Never place these items loose on the workbench. They can accidentally be pushed from the table top on to the floor and be lost. Using the zip lock bag helps you keep track of important parts and prevents you from having "extra" parts or not enough parts at the end of a job. At the end of workday, keep the parts in the zip lock bag and store it with the equipment still under repair.

Parts Holder - Sometimes called *mechanical fingers*, the *parts holder* is used to hold and retrieve small parts. Small articles that fall into places where they cannot be reach by hand may be retrieved with a parts holder. This tool is also used when starting nuts or bolts in areas that are difficult to reach. Mechanical fingers have a tube containing flat springs that extend from the end of the tube to form claw-like fingers.



Parts Holder - Sometimes called *mechanical fingers*, the *parts holder* is used to hold and retrieve small parts. Small articles that fall into places where they cannot be reach by hand may be retrieved with a parts holder. This tool is also used when starting nuts or bolts in areas that are difficult to reach. Mechanical fingers have a tube containing flat springs that extend from the end of the tube to form claw-like fingers. The springs are attached to a rod that extends from the other end of the tube. Pushing on the rod extends the fingers and a spring loaded mechanism retracts the fingers thus grasping the part. Mechanical fingers should not be used as a substitute for wrenches, screwdrivers, or pliers. The fingers are made of thin sheet metal and can be easily damaged by overloading.

Electrician's Pocketknife - The *electrician's pocketknife* serves many purposes. It consists of a regular cutting blade and a screwdriver-type blade. The *cutting blade* may be used to strip insulation from wires and to scrape the thin coat of varnish insulation from a copper conductor when making splices or connections. The *screwdriver-type blade* may be used to turn screws. When the knife is not in use, fold and place it in your tool kit. Knives should not be used for prying, and the blades should be kept clean, sharp, and free of nicks.



Needle Files - Files are tools designed specifically for removing material. There are different parts of the file you should be familiar with. The *face* of the file is the part of the file with the *cutting teeth* and does the actual filing. The *tang* is the part of the file where the *handle* is placed. The *point* of the file is the opposite end with the *edge* for the file being the sides of the face.

These tools are made in many shapes and grades of coarseness to suit a wide variety of jobs. General classification of files are according to the cross-sectional shape, the type of cut, and the length.

Shapes of files are flat, square, round, half-round, triangular, etc. Files with one row of parallel teeth are called single-cut files. Those with one row of teeth crossing another row of teeth (and forming a crisscross pattern) are called double-cut files. Cuts are also classified as to their different degrees of coarseness. Some sample descriptive terms are coarse, bastard, second-cut, smooth, and dead smooth.

The files shown here are called *needle files* because of their size and shape. They are small and finely-cut files that are used for precision work. They're used to file small amounts of metal and plastic such as rounding an edge or enlarging a hole. *Always choose the correct file for the job. When choosing a file, consider these factors:*

1. The kind of material to be filed.
2. The shape of the cut to be made.
3. The amount of materials to be removed.
4. The type of finish desired.

If there is a large amount of material to remove, start with a coarse file, progress to a file that is less coarse, and then finish with a smooth file. *When using the file, remember the following important points:*

1. Never use a file without a handle! The end of the tang is sharp and might easily be driven into the palm of your hand.
2. Clamp the work securely in vise.
3. Hold the broad end of the file with the handle against the palm of your right hand with your thumb on top.
4. Hold the narrow end of the file in your left hand with your fingers curled under it.
5. Hold the file straight.
6. File slowly - no more than 30 to 40 strokes per minute.
7. Remove all pressure on the backstroke.
8. Use only enough pressure to keep the file cutting.
9. Push a single-cut file sideways across the work to produce a very smooth surface. (Use a clean, smooth file for this type of work.)
10. Always clean a file that has become clogged with material. If you do not, it will damage the work. Use a file cleaner (bristle brush and steel-wire file card) and a file pick
11. You should remember the following cautions applicable to caring for files:
12. Never use a lubricant on the file.
13. Keep files dry. (Files will rust, and rust on the teeth of a file will dull its cutting edges.)
14. Never through files together in a toolbox.
15. Never put files where they may contact another tool.
16. Never use a file for any task other than filing.



Inspection Mirror - There are several types of *inspection mirrors* used in electronic equipment repair. Inspection mirrors come in a variety of shapes and sizes. The mirror itself is connected to the end of a rod and may be fixed or adjustable. This particular inspection device features a *magnet* on one end. The magnet is used to retrieve loose parts from hard to reach places. The inspection mirror aids in making detailed inspection where the human eye cannot see directly. By angling the mirror, and with the aid of a *flashlight* it is possible to inspect most hard to see areas inside equipment.



Pen Light - The *pen light* is a *flashlight* that's used to illuminate areas inside equipment that needs more light for you to work. The switch can be set up to provide constant light or momentary light at the press of a switch. The pen light is battery operated and the batteries should be changed as needed. They should also be removed if the pen light is not going to be used for a month or more. This prevents damage to the pen light should the batteries leak.

Review:

The PC Technician Toolkit contains all of the tools a computer technician might need to do their job. As a technician, you'll not only need to know the names of these tools, you'll need to know how to use them safely and care for them. Being able to identify each tool will help you maintain a complete inventory of your tools kit. Knowing how to use and care for your tools will protect your tools, your work, and yourself.



Tool ID and Use Guide

Exercise 1 – Cleaning Tools and Supplies

Exercise Objective:

Once you've completed this exercise, you should be able to identify the tools of materials used to clean computers and printers. You should also be able to describe their proper use and how to care for them.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

As a computer technician, you'll be doing a lot of cleaning. The following tools and materials are important because you can cause significant damage to a computer or printer if you use incorrect cleaners or use cleaning tools incorrectly.

Research Resources:

Company	Web Site	Description
Jensen Tools, Inc.	www.jensentools.com	Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Study the following tools using the PC Technician Toolkit lesson or the Tool ID and Use Guide. Make notes regarding their care and use using the PC Technician Toolkit Study Guide.

- Compressed Air
- Cotton Swabs
- Hard Bristled Brush
- Soft Bristled Brush
- Spray Cleaner
- Wipe Cloths
- Cleaning Diskette

1. List four rules to follow when using compressed air to clean a computer or printer.
2. Describe how you would use Spray Cleaner when cleaning a computer or printer.
3. What cleaning tool is best to clean dust from between the keys on a computer keyboard?
4. Which type of cleaning diskette is the best type to use?



Tool ID and Use Guide

Exercise 2 – Pliers

Exercise Objective:

Once you've completed this exercise, you should be able to identify the types of pliers used to service and support computers and printers. You should also be able to describe their proper use and how to care for them.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

One of the important considerations about the use of pliers is that you make the correct selection for the job to be done. If you use the wrong type of pliers, you may injure yourself and almost certainly damage your work. A pliers that is too large can damage your work and using a pliers too small will damage the tool. Pliers are also an essential wiring tool. There are many different kinds of pliers.

Research Resources:

Company	Web Site	Description
Jensen Tools, Inc.	www.jensentools.com	Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Study the following tools using the PC Technician Toolkit lesson or the Tool ID and Use Guide. Make notes regarding their care and use using the PC Technician Toolkit Study Guide.

- Groove Joint Pliers
- Wire Strippers
- Hemostats
- Needle Nose Pliers
- Chain Nose Pliers
- Mini Diagonal Cutters

1. What type of pliers are delicate and made for holding, manipulating, and bending tiny parts?
2. Why do you have to adjust wire strippers before you use them?
3. What is another name for longnose pliers?
4. What is the name of the pliers that can be adjusted to various opening widths and used to secured and turn medium to very large nuts and bolts?

Tool ID and Use Guide

Exercise 3 – Drivers

Exercise Objective:

Once you've completed this exercise, you should be able to identify the types of drivers used to service and support computers and printers. You should also be able to describe their proper use and how to care for them.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

Drivers are made in various shapes and lengths and are designed to perform specific jobs. The size of the screwdriver is indicated by the length of the blade and the size of the tip. The size and shape of the blade tips vary from narrow parallel-sided tips to wide, tapered tips. Some screwdrivers have special tips for cross-slotted, recessed screws or bolts, and clutch-bit screws. Some screwdrivers are even provided with a ratchet in the handle to make them easier to use.

Always use a driver that fits the screw slot exactly. A poor fitting driver can damage the screw and driver, slip off the screw, and cause personal injury. If a tight screw with a damaged slot can be backed out partially, it is possible to remove it completely by turning it with a pair of pliers. When a driver becomes chipped, or the gripping edges become rounded, or when other damage occurs so that it doesn't fit the screw, don't use it. Remember that drivers are used for one purpose only - to turn screws. They must never be used for any other task.

Research Resources:

Company	Web Site	Description
Jensen Tools, Inc.	www.jensentools.com	Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
 Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Study the following tools using the PC Technician Toolkit lesson or the Tool ID and Use Guide. Make notes regarding their care and use using the PC Technician Toolkit Study Guide.

- Driver Handles
- Slotted Screwdrivers
- Phillips Screwdrivers
- Nut Drivers
- Common Screwdriver – 3/32"
- Phillips Screwdriver – Size 0
- Aligner #1 and #2
- Trimpot Adjuster
- Screw Starter

Identify the best driver used to secure and adjust the following fasteners and devices:

Fastener	Tool Name	Fastener	Tool Name
 Pan Head		 Trim Pot	
 Pan Head		 Pan Head	
 Pan Head		 Hex Nut	

Tool ID and Use Guide

Exercise 4 – Wrenches

Exercise Objective:

Once you've completed this exercise, you should be able to identify the types of wrenches used to service and support computers and printers. You should also be able to describe their proper use and how to care for them.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

One of the important considerations about the use of wrenches is that you make the correct selection for the job to be done. If you use the wrong type of wrench, you may injure yourself and almost certainly damage your work. A wrench that is too large can damage your work and using a wrench too small will damage the wrench.

Research Resources:

Company **Web Site**
 Jensen Tools, Inc. www.jensentools.com

Description
 Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.
 Tool and hardware supply for industrial needs.

McMaster-Carr Supply Co www.mcmaster.com

Required Materials:

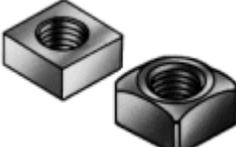
PC Technician Toolkit Lesson
 Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Study the following tools using the PC Technician Toolkit lesson or the Tool ID and Use Guide. Make notes regarding their care and use using the PC Technician Toolkit Study Guide.

- Ignition Wrench
- Adjustable Wrench
- Torx Key Set
- Hex Key Set

Identify the best wrench used to secure the following fasteners:

Fastener	Tool Name	Fastener	Tool Name
 Cap Head Bolt		 Button Head Screw	
 Square Nuts		 Set Screws	
 Cap Head Screw		 Machine Screw	



Tool ID and Use Guide

Exercise 5 – Miscellaneous & Special Tools

Exercise Objective:

Once you've completed this exercise, you should be able to identify the types of Miscellaneous and Special tools used to service and support computers and printers. You should also be able to describe their proper use and how to care for them.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

There are many miscellaneous and special tools you'll need to inspect, service, and support computers and printers. These tools fall into this category because they can't be considered as either a cleaning, pliers, driver, or wrench type of tool. Their use is more specialized which makes them irreplaceable in particular situations. Remember... Never use substitutes... Always use the right tool for the job.

Research Resources:

Company	Web Site	Description
Jensen Tools, Inc.	www.jensentools.com	Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Study the following tools using the PC Technician Toolkit lesson or the Tool ID and Use Guide. Make notes regarding their care and use using the PC Technician Toolkit Study Guide.

- Multi-meter
- Diagnostics Software
- Parts Box
- Zip-Lock Bags
- Parts Holder
- Pocket Knife
- Needle Files
- Inspection Mirror
- Pen Light

1. Make a list the four types of measurements a multimeter can test.
2. What kind of tool features a tang?
3. What tools in your toolkit can be used to temporarily store parts while repairing equipment?
4. When using diagnostics software, what item is required to test the COM parallel, and sound card ports?



Tool ID and Use Guide

Exercise 6 – Toolkit Vocabulary

Exercise Objective:

You will research and compile a list of definitions for the following terms that deal with tool identification, use, and care.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

Vocabulary is one of the most essential tools found in a computer technician's toolbox. You'll need a strong command of the language regarding all aspects of tool identification, use, and care. There's nothing more insulting to a professional technician as referring to a tool by calling it a "What-You-McAll-It" or "thingy". When working in teams to solve computer problems, every member of that team has to use the same terms otherwise confusion and lost time will result. The mastery of a specialized vocabulary will become more important to you as you actually start working on computers and printers. You not only need to walk the walk... You'll also need to talk the talk. Learn the names and uses of your tools.

Research Resources:

Company	Web Site	Description
Jensen Tools, Inc.	www.jensentools.com	Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
Tool ID and Use Guide

Procedure:

Print out this exercise sheet. Each of these words are referred to, but may not actually be defined in the PC Technician Toolkit lesson. That means that you'll have to use a variety of sources to come up with the definitions for the following words. You can use a dictionary, the CSS Glossary, or Internet to research these words. Process any formal definition you find by rewriting it in a language that you understand. Definitions that are simply cut and pasted will not be accepted.

Define the following words on a separate sheet. Each definition should be between two and three sentences long and contain specific information as it pertains to tool identification, use, and care. Sketches are permitted as part of your definition.

1. Aerosol Propellant
2. Diagnostics
3. Wire Gauge
4. Spline
5. Auto-Range
6. Box-End Wrench
7. Potentiometer
8. Screwdriver Blade
9. Jaw
10. Tang



Tool ID and Use Guide

Exercise 7 – Toolkit Inventory

Exercise Objective:

You will identify all of the tools in your PC technician toolkit by conducting a complete inventory of the kit and reporting any missing tools or materials.

Name:	
Period:	
Date:	

Discussion of Fundamentals:

One of the more important employability skills you'll need to master is the care and use of company materials. The PC technician toolkit is a good place to start. Anytime a technician goes on a job they'll need a complete toolkit. There's nothing more frustrating to a technician than arriving at a job site, starting work, and then realization they're missing a tool or something else they need. Always inventory your toolkit before heading out on a job. You'll also need to inventory it when you turn it in. It's important to note that your program may have a different type of toolkit than what's featured in this module. That's OK. Just use the inventory sheet that came with your toolkit to conduct this exercise.

Research Resources:

Company

Jensen Tools, Inc.

Web Site

www.jensentools.com

Description

Jensen Tools, Inc. is a tool and toolkit manufacturer. Their website holds a collection of tools and toolkits used for a variety of occupations in technical industries.

Required Materials:

PC Technician Toolkit Lesson
 Tool ID and Use Guide
 Toolkit Inventory Sheet

Procedure:

Print out this exercise sheet and the Toolkit Inventory Sheet for the PC Technician Toolkit used in your CSS program. Complete the inventory sheet by going down the list of tools item-by-item making note of any missing items from the kit. Report any missing or extra items to your supervisor. Secure the completed inventory to this exercise sheet and show it to your supervisor.