

Chapter 11

Overview

This module provides detailed information about printers and printing. Students will learn how different printers operate, what to consider when purchasing a printer, and how to connect printers to an individual PC or to the network. Print management, including utilizing the queue and configuring printer options, is covered. Additionally, the student will learn how to troubleshoot basic printer problems such as paper jams.

Understanding Printers and Printing

Printers are an important part of modern PC systems. Hard copies of computer and online documents are as important today as they were when the paperless revolution began several years ago. Modern computer technicians must be able to understand the operation of various types of printers in order to install, maintain, and troubleshoot printer problems.

Some industries use thermal printers. This is a non-impact type of printer that uses heat to transfer images to paper. The printhead contains small resistive heating pins that melt a wax-based ink onto plain paper or burn dots onto paper coated especially for the process.

The two types of thermal transfer printers are direct thermal and thermal wax transfer. Direct thermal printers do not use ribbons. The printer prints the image by burning dots onto a specially coated paper as it passes over the heated printhead. Direct thermal printing was used by older fax machines.

Printers are connected to PCs with USB, FireWire, serial, parallel, network cable connections or wireless. Wireless types of connections include infrared and radio wave technology.

Printer drivers are software that must be installed on the PC so that the computer can communicate with the printer and coordinate the printing process. Printer drivers vary according to printer type, manufacturer, model, and PC operating system.

Dot Matrix Printers

The dot matrix printer belongs to a printer class called impact printers. In this type, the printhead actually impacts a printer tape or inked ribbon to cause characters to be formed on paper.

In the dot matrix printer, this impact happens as the printhead fires pins or print wires at an ink ribbon, which contact the paper and leave a mark. The printhead, or the assembly that contains the pins, moves left to right across the paper, one line at a time. This creates letters out of the circular dots of ink that impact the paper.

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The number of pins, as in 9-pin, 24-pin, or 48-pin printers, indicates the quality of the print. This is the actual number of pins that are located in the printhead. The highest quality of print that is produced by the dot matrix printer is referred to as Near Letter Quality (NLQ). How fast the dot matrix printer can operate is measured in characters per second (cps).

Inkjet Printers

Colour inkjet printers are the most common type of printer in home use today. This is because of their low cost and moderate quality of print. Inkjet printers usually print one column of dots in a line at a time. They are typically faster than dot matrix printers.

The inkjet printer uses liquid ink-filled cartridges that force out and spray ink particles at the page through tiny holes called nozzles. The ink particles are forced out by applying pressure that is caused by electricity or an electrical charge. Pressure inside the ink reservoir of the cartridge is less than the outside pressure. When the electricity is applied, then the pressure rises. This internal pressure causes small dots of ink to be forced out through the nozzles.

Inkjet printers are designed to use plain paper, but they may also be used with very specific inkjet paper when high quality print or photographs are required.

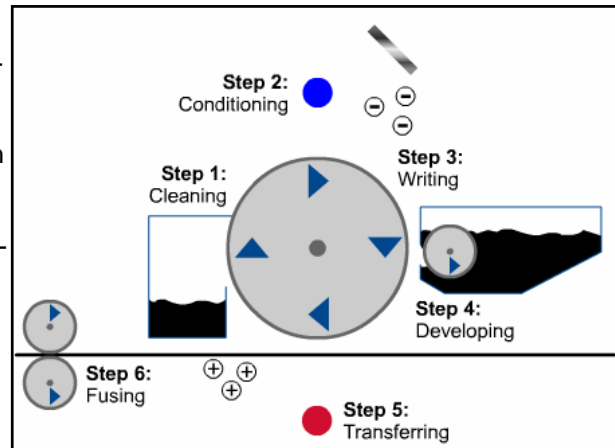
When the inkjet print operation is complete and the paper leaves the printer, the ink is often still wet. Touching it immediately can smear the ink and smudge the printout. Most inks dry in 10 to 15 seconds.

Laser Printers

Today, the laser printer is the printer most commonly used because of its high resolution, superior operation, and speed. However, its internal operation is more complex than other types of printers. Static electricity is used in the operation of a laser printer. This attraction is used to temporarily hold small dry ink particles called toner to a statically charged image on an electrophotographic drum. A laser beam is used to draw this image.

Note: The photosensitive drum should never be exposed to light for long periods of time.

This laser printing process is completed in the following six steps:



Cleaning – When an image has been deposited on the paper and the drum has separated from the paper, any remaining toner must be removed from the drum. One method uses a blade to scrape all excess toner from the drum. Other printers use an AC voltage on a wire that removes the charge from the drum surface and allows the excess toner to fall away from the drum. The excess toner is stored in a used toner container that may be emptied and/or discarded.

Conditioning – This step involves removing the old latent image from the drum and clearing or conditioning the drum for a new latent image. Placing a special wire, grid, or roller that is charged to about – 6000 volts DC uniformly across the surface of the drum accomplishes this. This charged wire or grid is referred to as the primary corona. Some printers provide this charge by using a conditioning roller. The charge impressed upon the surface of the drum is -600 to -1000 volts DC.

Writing – This process involves scanning the photosensitive drum with the laser beam. Every portion of the drum that is exposed to the light has the surface charge reduced to about -100 volts DC. This electrical charge has a lower negative charge than the remainder of the drum. As the drum turns, an invisible latent image is created on the drum.

Developing – This is the step where the toner is applied to the latent image. Inside the toner unit are developer particles made up of magnetic materials. These magnetic particles are coated with a plastic-like material. A triboelectric charge on the developer particles causes it to attract toner. The toner as a result, is charged to around -200 volts DC. This causes it to be attracted to the more positive or -100 volts DC areas of the photosensitive drum. However, it is repelled by the more negative or -600 volts DC areas. Typically, a cylinder within the toner unit releases toner so it can fall against a control blade or developer blade as the developer rollers travel. Also known as the restricting blade, the control blade keeps toner from pouring onto the drum. Instead, it holds the toner at a microscopic distance from the drum. The toner then leaps from the control blade to the drum where it is attracted by the more positively charged latent image.

Transferring – In this step, the toner attached to the latent image is transferred to the paper. The transfer or secondary corona places a positive charge on the paper. Since the drum was charged negatively, it attracts the negative toner image from the drum to the paper. The image is now on the paper and is held in place by the positive charge.

Fusing – The toner particles on the paper are only there because of the charge that is present. They are kept in place permanently by the fusing process. In this process, the printing paper is rolled between a heated roller and a pressure roller. As the paper rolls, the top fuser roller is heated to about 350 degrees, which melts the loose toner powder fusing with the fibres in the paper. This operation is called fixing by some manufacturers. After the fusing operation is complete, the paper is moved to the output tray as a printed page.

Warning: When working around the fuser, remember, that it is hot enough to burn the skin. Always allow it to cool before removing it or servicing it.

Connecting a Printer

Printers require a method of communicating with the computers they serve. Communication is accomplished through the ports on both the printer and the computer or network device. Communication can also be accomplished by using wireless technologies such as infrared signals. Most printers use serial, parallel, USB, and SCSI ports with the appropriate network cables to receive information from computers.

Serial

Serial ports are usually found on dot matrix printers that do not require high-speed transfers of data. Serial data transfer moves single bits of information in a single cycle. The maximum length of serial cable is 50 feet (18 meters).

Parallel

Parallel printers that use parallel communication have faster data transfer rates than serial printers because parallel data transfer moves multiple bits of information in a single cycle. This provides a wider path for information moving to or from the printer. IEEE 1284 is the current standard for parallel printer cables. Parallel printer cables have two unique ends. The Type-A connector connects to the PC or daisy-chained peripheral and has two screws that should be hand-tightened. The Centronics connector connects to the printer and should be secured in place with the port clips.

USB

Universal Serial Bus (USB) is a very common communication type for not only printers but also other devices due to its speed and ease of setup. Newer operating systems offer plug-and-play USB support.

SCSI

Small Computer System Interface (SCSI) is a type of interface that uses parallel communication technology to achieve high data transfer rates.

Network

Network printers are commonly used in the workplace because they act as shared resources for all users on the network. Users are not required to have their own printers. Connecting a printer to the network requires the correct type of cabling that is compatible with the existing network. Most network printers ship with an RJ-45 interface for connection into an Ethernet network. The maximum length of a Category 5 cable to connect a printer to the network is 328 feet (100 meters).

Q1. What type of printer cable/connection has a maximum length of 18 meters?

- a) USB
- b) Network
- c) Serial

Q2. _____ printers can be used by more than one PC at a time.

Q3. Parallel printer cable are currently defined according to _____.

Q4. Category 5 cable has a maximum length of _____.

Q5. On a Parallel printer cable, the _____ connector connects to the computer and the _____ connector connects to the printer.

Installing a Printer

Adding a local printer is a relatively easy process. In Windows 2000, go to the Start > Settings > Printers. Figure shows the Printer window. Double-click on the Add Printer button. The Add Printer Wizard will launch.

Choose the port to be assigned. The most common port for local printers, which is LPT1. The printer manufacturer and model type must be provided. Choose the exact model from the list. If the model does not display, check the user guide that came with the printer for guidance or choose a model from the same manufacturer with a similar name. For instance, if the printer is an HP DeskJet 550 and that particular model is not listed in the Add Printer Wizard, the closest model would be the HP DeskJet 500.

After a printer is chosen, the wizard will notify the user that the printer is now ready to use as shown in Figure . This does not mean, however, that the printer and the computer are communicating properly. To verify this, a test page should be printed.

Q6. How would you initiate the "Add Printer" Wizard?

Sharing a Locally Installed Printer.

Printer sharing allows multiple users or clients to access a printer directly connected to a single computer, which is the print server. Sharing resources, like printers, was one of the reasons why networks were developed. A group of users sharing a single printer is far more economical than buying each user an individual printer.

For print sharing to work, special software must be installed and configured on the print server. Then the clients must be configured to be able to access the printer located on the print server. While third-party software applications are available, most personal computer operating systems have printer-sharing capability built-in.

In Windows, this option is called File and Print Sharing. While Windows 2000 installs this component automatically, it is easily added to the rest of the Windows operating systems. To install File and Print Sharing or to verify that it is installed on a Windows 9x computer, right-click on My Network Places in Windows ME or Network Neighbourhood in Windows 95/98 and choose Properties. The user can verify if File and Printer Sharing for Microsoft Networks is installed. If it is not installed, the user can easily do so by clicking the File and Print Sharing button and check either "I want to be able to give others access to my files.", or "I want to be able to allow others to print my from printer(s).", or both. Remember, the printer must be installed and configured on the print server before printer sharing will work.

After verifying that the printer sharing software is installed, the server must know which printer it is going to share. In the Printers folder, right-click on the printer to share, choose Properties, and select the Sharing tab. Choose the option to share the printer and assign it a unique name.

Finally, each client computer that will access the printer must have the correct printer drivers installed. Begin the Add Printer Wizard to find and install the shared printer. If configured properly, the client will automatically download the driver information from the server.

Q7. In Windows, what must be enabled to allow a printer to be shared from a computer?

Dealing with Paper. Woo.

Obstructions in the paper path

A large majority of printer problems are paper jams. In fact, a lot of the problems are related to the paper itself. Fragments of paper that are torn in the printing process often must be removed from the paper path. This usually involves understanding the path that the paper travels from the registration roller to the output roller. A closer visual check of this path will usually disclose the location of the fragment. Care must be taken not to damage the printer while removing the obstruction.

Wrong Type of Paper

Most printers are designed for a specific type of paper and certain weight of paper. When problems occur such as clumping or folding, the type of paper should be checked to see if it is in compliance with the recommendations of the manufacturer.

High Humidity

A majority of the printers that are used today print on cut sheets of paper. Paper handling problems are much more likely to occur than in older printer versions that required tractor feed sheets of paper. These problems include jams and clumping of paper. One of the primary reasons for these types of problems is damp paper. Paper has a tendency to absorb dampness when it is stored. A cool, dry place is the best place to store paper. High humidity areas should always be avoided for paper storage. The paper package should not be opened until it is ready to be used. It is good to riffle, or fan, through the edges of the paper before putting it into the printer.

Q7. Which of the following conditions are best to store paper in? Circle two.

- Dry
- Wet
- Warm
- Smelly
- Sticky
- Snow
- Rainy
- Fishy
- Cloudy
- Sausagy
- Gooey
- Windy
- Cool
- Slimey
- Slushy
- Greasy
- McDonalds