PREFACE-WELCOME TO THE PERSONAL LASERWRITER NT PRINTER

This manual is your introduction to the Apple Personal LaserWriter NT printer. Use it now to set up and begin working with the Personal LaserWriter NT. Use it later as a reference for day-to-day routines and as a guide to maintenance and troubleshooting.

The Personal LaserWriter NT works with any Macintosh or Apple IIgs computer , and with any Apple IIe computer equipped with an Apple II Workstation Card. If you're new to the Apple world, read the books that came with your computer before proceeding. You'll need to know basic operations and vocabulary to set up and print with the Personal LaserWriter NT.

You can also use the Personal LaserWriter NT with an IBM PC or compatible computer. If you are going to be using an MS-DOS machine, be sure to familiarize yourself with its basic operation.

How to use this manual
If you are a new owner using a Macintosh computer, you should read the Quick Setup Guide (or Chapter 1), Chapter 2, and Chapter 3 right away to get started working with your Personal LaserWriter. Turn to Chapter 4 when you're ready to learn more about typography. Read Chapters 5 and 6 to learn how to care for your printer.

- Use the Quick Setup Guide or Chapter 1, "Setting Up the Personal LaserWriter NT," to set up your Personal LaserWriter and connect it to your computer.

- Chapter 2, "Installing Printer Software," tells you how to install the printer drivers and the fonts you'll use to print.

- Chapter 3, "Printing Documents," is a reference guide for day-to-day operation.

- Chapter 4, "Working With Fonts," covers the basics of Macintosh typography and the Personal LaserWriter fonts.

- Chapter 5, "Maintenance," covers routine maintenance procedures such as replacing the toner cartridge.

- Chapter 6, "Troubleshooting," covers solutions for minor problems that may occur.

About the Personal LaserWriter NT

The Personal LaserWriter NT is a member of a new generation of Apple laser printers. With this printer you can print both text and graphics at close to typeset quality.

You can develop your documents using any application designed for the Macintosh, including all page-layout and graphics programs. With the appropriate connections, you can also use all such programs designed for MS-DOS computers.

Twelve font families are built into the Personal LaserWriter NT: ITC Avant Garde, ITC Bookman, Courier, Helvetica, Helvetica Narrow, New Century Schoolbook, Palatino, Symbol, Times, ITC Zapf Chancery, ITC Zapf Dingbats, and IBM PC Graphics Extended Character Set (ECS). You can also choose from a

wide array of fonts available either commercially or as shareware or freeware. See Chapter 4, "Working With Fonts," for details.

If you want programming or additional technical information about the Personal LaserWriter NT, write to APDA (Apple Programmers and Developers Association):

Apple Computer, Inc.
APDA, Mailstop 33-G
20525 Mariani Avenue Cupertino, CA 95014-6299
(800) 282-APDA (800-282-2732)

Important safety instructions

Read all the installation instructions (in the Quick Setup Guide or in Chapter 1) carefully before you plug the LaserWriter into a wall socket.

For your own safety and the safety of your equipment, always take the following precautions.

- Keep the LaserWriter away from sources of liquids, such as wash basins, bathtubs, and shower stalls.

- Protect the LaserWriter from dampness or wet weather, such as rain and snow.

- Don't use devices that produce open flames, such as Bunsen burners or welding torches, near the LaserWriter.

- Don't use ammonia-based cleaners, which can react chemically with the toner, on or around the LaserWriter.

- Keep these instructions handy for reference.

- Follow all instructions and warnings dealing with your system.

!! WARNING: Electrical equipment may be hazardous if misused. Operation of the LaserWriter or of similar products must always be supervised by an adult. Do not allow children access to the interior of any electrical product and do not permit them to handle any cables. !!

Watch for these situations and if one occurs pull the plug!

If you encounter any of these circumstances, be sure to disconnect the power plug immediately! (Disconnect by pulling the plug, not the cord.)

- The power cord or plug is frayed or otherwise damaged.

- You spill anything into the case.

- The LaserWriter is exposed to rain or any other excess moisture.

- The LaserWriter has been dropped, or the case has been otherwise damaged.

- You suspect that the LaserWriter needs servicing or repair.

- You plan to clean the exterior of the case.

If you suspect your LaserWriter is damaged, contact your authorized Apple dealer.

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly -- that is, in strict accordance with Apple's instructions -- it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation.

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices.

If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.

- Move the computer to one side or the other of the television or radio.

- Move the computer farther away from the television or radio.

- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)

- Consider installing a rooftop television antenna with a coaxial cable lead-in between the antenna and the television.

If necessary, consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission: "How to Identify and Resolve Radio-TV Interference Problems" (stock number 004-000-00345-4). This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

!! IMPORTANT: Changes or modifications to this product not authorized by Apple Computer, Inc., could void the FCC certification and negate your authority to operate the product.

CHAPTER 1-SETTING UP THE PERSONAL LASERWRITER NT

This chapter tells you how to put together your Apple Personal LaserWriter NT printer. You'll find instructions for:

- Choosing the best place to put the printer

- Unpacking and opening the printer

- Preparing the printer for use

- Connecting to a Macintosh computer

- Plugging in and turning on the printer

If you've already set up your LaserWriter using the instructions in the Quick Setup Guide, you can skip this chapter. Go on to Chapter 2, "Installing Printer Software."

Choosing a location for the LaserWriter

Before you begin setup, choose a work area that's efficient for you and that meets the physical requirements of the printer.

- Ordinary household current (with no symptoms of electrical problems, such as lights flickering when you run a big appliance, an air conditioner, or a photocopier)

- Well-ventilated area away from direct sunlight

- Temperature between 64 and 77 degrees Fahrenheit (18 and 25 degrees Celsius)

- Humidity between 30 and 70 percent

- Enough space around the printer to allow good air circulation and easy access to various features:

Choose a flat, stable surface for the printer. Be sure to leave adequate room to load and unload the paper cassette and to open the multipurpose tray and face-up tray.

Do you have what you need?

If you haven't already done so, unpack your LaserWriter printer and toner cartridge. Be sure you have these items:

The toner cartridge comes in a box of its own, separate from the printer. If you haven't already done so, take the cartridge out of the box and remove the plastic wrapper.

You should also have two LocalTalk Locking Connector Kits (the DIN-8 version). You can purchase these kits from your authorized Apple dealer. In each kit you will find:

You need two kits because you must have one connector box for each device on a network. In this case, you need one connector box for your printer and the second one for your computer.

Opening the LaserWriter

Open the access door, at the front of the printer, so you can insert the toner cartridge.

Installing the toner cartridge

The toner cartridge contains the powdered "ink" the printer uses. Each cartridge lasts for about 3500 pages, depending on the kind of printing you

do. If you print a lot of graphic images, you may need to change cartridges more often.

1. Unpack the toner cartridge and gently rock it to distribute the toner inside.

2. Grab the tape tab and remove the tape.

3. Insert the cartridge into the LaserWriter printer.

4. Close the access door.

If the door will not shut, the gears may not have meshed properly to receive the toner cartridge. See "Access Door Won't Shut" in Chapter 6, "Troubleshooting."

When it's time to replace this toner cartridge with a new one, you must perform a simple cleaning procedure. You'll find instructions for replacing the cartridge and using the Cleaning Page in Chapter 5, "Maintenance."

Loading the paper cassette

The paper cassette fits neatly into the base of the printer. The cassette holds up to 250 sheets of paper and feeds the paper automatically while printing is going on.

By the way: This procedure is the one you are likely to use most frequently. To learn about the alternatives available to you, see Chapter 3, "Printing Documents."

1. Pull the paper cassette out.

2. Load paper into the paper cassette.

3. Slide the paper cassette back into place in the printer.

Connecting the LaserWriter to your Macintosh

To complete this procedure you need two LocalTalk Locking Connector Kits (the DIN-8 version). Before you begin connecting the LaserWriter to your Macintosh, make sure both the printer and the computer are turned off.

!! IMPORTANT: If you intend to connect the LaserWriter to a large network, you may need some additional equipment. See the LocalTalk Cable System Owner's Guide for details.   !!

Plugging in and turning on the LaserWriter

!! WARNING: The LaserWriter is equipped with a three-wire grounding plug -- a plug that has a third (grounding) pin. This plug will fit only a grounding-type AC outlet. If you are unable to insert the plug into an outlet, contact a licensed electrician to replace the outlet with a properly grounded one. This equipment is meant to be electrically grounded. Do not defeat the purpose of the grounding plug!   !!

The LaserWriter takes about a minute to warm up, and then it automatically prints a startup page. (It prints the startup page every time you restart it.)

As the startup page prints, check the LaserWriter status lights. The green Ready/In Use light will flash until the page is printed, then it will glow steadily. All other lights should be off.

Congratulations! You've set up your Personal LaserWriter NT printer and connected it to your Macintosh. Next, follow the instructions in Chapter 2, "Installing Printer Software."

CHAPTER 2-INSTALLING PRINTER SOFTWARE

To install the necessary printer software you need the two disks that came with your Personal LaserWriter NT printer. If you haven't unpacked them yet, look inside the accessory kit for these labels:

- The Personal LaserWriter NT Installation Disk contains the printer software that controls printer operation and lets the LaserWriter and your Macintosh communicate. It also contains a utility program called Namer that lets you give your printer a name other than "Personal LaserWriter NT."

- Personal LaserWriter NT Fonts contains the screen fonts you need to install on your computer. (For detailed information about how fonts work with the LaserWriter printer, see Chapter 4, "Working With Fonts.")

!! IMPORTANT: Be sure to make copies of the Personal LaserWriter NT Installation Disk and the Personal LaserWriter NT Fonts disk to use in the installation process. Store the originals in a safe place. (The books that came with your Macintosh have instructions on copying disks.) !!

Do you need LaserWriter and Laser Prep? If you have added the Personal LaserWriter printer to an existing network that includes other LaserWriter printers, you may be able skip this procedure. You probably have the appropriate printer software installed as part of your Macintosh system software.

To determine whether you already have the correct printer software, check inside the System Folder on your hard disk. In the example below, you can see that the LaserWriter and Laser Prep files appear inside the System Folder.

If LaserWriter and Laser Prep appear in your System Folder, skip to "Installing PrintMonitor" later in this chapter.

Installing LaserWriter and LaserPrep

To install the files called LaserWriter and Laser Prep, copy them from the Personal LaserWriter NT Installation Disk to your startup disk.

Is your startup disk a floppy disk? The instructions below are correct whether your startup disk is a hard disk or a floppy disk. With a floppy disk, however, you may have problems fitting everything on the disk. For information on installing small system files and reclaiming space on a floppy disk, see the books that came with your Macintosh.

1. If necessary, select and open the startup disk icon.

The window for the startup disk appears.

2. Insert the Personal LaserWriter NT Installation Disk into a floppy disk

drive.

If necessary, open the disk icon.

3. Copy LaserWriter and Laser Prep to the System Folder on your startup disk.

That's it! You've installed LaserWriter and Laser Prep.

Installing Printer Monitor

The Personal LaserWriter NT Installation Disk contains version 1.3 of PrintMonitor. If you have an earlier version of PrintMonitor in your System Folder, delete it and replace it with version 1.3.

Now go on to give your printer a name of its own.

Naming the printer

If your network includes more than one printer, it's a good idea to give each one a distinguishing name. To name your printer you use the Namer utility, which you'll find on the Personal LaserWriter NT Installation Disk. Before you use the Namer, make sure the printer is turned on.

The Namer dialog box appears.

You can use this procedure to name (or rename) all LaserWriter printers on the network. (Tell everyone what the new names are.)

Installing the Cleaning Page

The Cleaning Page is a TeachText document that appears on the Personal LaserWriter NT Installation Disk. This document is important to the care and maintenance of your LaserWriter printer. (For more information, see "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5.)

When you need to print the Cleaning Page, you can always use the copy on the Personal LaserWriter NT Installation Disk. If you prefer, you can drag a copy of the Cleaning Page to your hard disk and print it from there.

The other folder

There is a folder named Other on the Personal LaserWriter NT Installation Disk. This folder contains version 6.0.1 of the LaserWriter driver, for use with printers that can print in color or gray scale. It also contains Font Utility, an application you can use to store downloadable fonts temporarily in random-access memory (RAM).

Installing fonts

The LaserWriter printer comes with certain fonts in the printer's memory. To see the best image of these fonts on your screen, you must install corresponding screen fonts. To do this you use a utility application called Font/DA Mover.

1. Insert the Personal LaserWriter NT Fonts disk, and open the Font/DA Mover on that disk.

The Font/DA Mover dialog box appears.

2.   To display the fonts from the Personal LaserWriter NT Fonts disk, click Open.

The directory dialog box that appears lets you navigate to the Personal LaserWriter NT Fonts disk.

3.   In the Personal LaserWriter Fonts list, drag down the list to select (blacken) the fonts you want to copy.

4.   Click Copy and wait until the process is finished.

5.   Verify that the fonts you copied are included in the list of fonts in your System file.

6.   Click Quit.

Congratulations! You have successfully installed the LaserWriter printer software. Next, you need to identify your new printer in the Chooser. See "Choosing a Printer" in Chapter 3.

Click the hard disk icon and choose Open from the File menu. (Or double-click the icon.)

Installing LaserWriter and Laser Prep

System Folder

(where you need to place the LaserWriter and Laser Prep icons)

Printer software already installed

Chapter 2: Installing Printer Software

Click the Namer icon and choose Open from the File menu. (Or double-click the icon to open it.)

Naming the printer

1   To select the type of device, click the LaserWriter icon.(You may see icons for different printers here depending on what you have in your System Folder.)

2   If it's not already selected, click the current name of your printer ("Personal LaserWriter NT" in this case).

5   When you're finished, click Quit.

3   Type a name for the printer.

4   Click Rename.

Chapter 2: Installing Printer Software

Installing PrintMonitor

Chapter 2: Installing Printer Software

Drag the selected icon to the System Folder. When the System Folder is highlighted (changes color), release the mouse button.

Chapter 2: Installing Printer Software

Installing fonts

Click the Font/DA Mover icon and choose Open from the File menu. (Or double-click the icon.)

For access to the fonts on the Personal LaserWriter NT Fonts disk, click Open.

These are the fonts already installed on your disk. (You want to add to this list.)

Name of current startup disk

The Other folder

You can copy the Cleaning Page to your hard disk.

Chapter 2: Installing Printer Software

Installing the Cleaning Page

Fonts successfully installed in your System file

Chapter 2: Installing Printer Software

If necessary, click the Drive button until you see Personal LaserWriter Fonts here.

Click the Personal LaserWriter NT Fonts file, then click Open.

Click the first name, then drag the pointer down past the bottom of the box until you reach the end of the list.

CHAPTER 3-PRINTING DOCUMENTS

Printing a document can be as simple as choosing the Print command, or you can take advantage of special options and features. This chapter tells you about:

- Choosing a printer from the network

- Defining your page setup

- Printing from within an application program or from the desktop

- Printing on different kinds of paper

Choosing a printer

To use your LaserWriter for the first time (or to change from one printer to

another), you must let the Chooser know which printer you want to use.

The Chooser window appears.

!! IMPORTANT: You don't need to use the Chooser every time you print. You must choose a printer the first time you print. After that, use the Chooser only to change to a different printer. !!

Defining your page setup

Because the most frequently used options are preset, you do not have to use Page Setup every time you print. This command lets you change specific printing options, such as paper size.

If you are using an application program, the dialog box may not look exactly like the one shown here, but all Page Setup dialog boxes have many features in common.

1.   Choose Page Setup from the File menu.

- Font Substitution converts certain Macintosh screen fonts into corresponding LaserWriter fonts.

- Text Smoothing and Graphics Smoothing may improve the appearance of printed text and graphics by "smoothing" rough edges.

- Faster Bitmap Printing can speed up the time it takes to print bitmaps (such as MacPaint documents or Kanji text).

2.   To see additional features, click Options.

- Flip Horizontal and Flip Vertical flip the image of your page along a horizontal or vertical axis.

- Invert Image lets you print a negative image of your document.

- Precision Bitmap Alignment reduces the everything on the printed page by 4 percent, letting you avoid minor distortions. To see what difference this setting makes, print a document with it and without it.

- Larger Print Area lets you print on more of the total page area. This option uses some memory in the LaserWriter that might otherwise hold downloadable fonts. If you can't download all the fonts you need, turn off Larger Print Area or turn on Unlimited Downloadable Fonts.

- Unlimited Downloadable Fonts removes any limit on the number of fonts you can download, but your document may take longer to print. You can select both Larger Print Area and Unlimited Downloadable Fonts.

Printing from within a program

To print a document from within an application program, the program must be open and the document window must be active.

In most cases a Print dialog box appears, with options for printing your document. The dialog box may not look exactly like the one shown here, but it will have options in common with this one.

Printing from the desktop

Printing from the desktop is ideal when you know which document you want to print -- and you want to print it as is, with no changes. (If the application program used to create the document is already open, it's best to print from within the program.)

To print from the desktop:

1. Select the icon of the document you want to print.

2. Choose Print from the File menu.

The program you used to create the document opens temporarily. Then the Print dialog box appears, with options for printing your document.

Printing from the paper cassette

For most of your day-to-day printing you'll probably use the paper cassette and let the LaserWriter printer feed the paper automatically.

The paper cassette works best when you use 20-lb. typewriter or photocopy bond paper. Although 20-lb. paper is recommended, the cassette will accept 16-lb. to 28-lb. paper.

As long as the weight is acceptable, you can also use:

- Three-hole punched paper

- Letterhead paper

Three-hole punched paper. You can print documents on paper that's three-hole punched (for use in a three-ring binder, for example).

Letterhead paper. To dress up reports and letters, you can print on letterhead paper. Just make sure the weight of the paper is between 16 and 28 pounds -- with 20-lb. paper being the best choice.

Printing from the envelope cassette

The Personal LaserWriter printer lets you print on up to 15 envelopes automatically from the optional envelope cassette. Use only envelopes whose size falls within these ranges:

- Minimum: 3.5 x 7 inches (86 x 178 mm)

- Maximum: 7.4 x 10.5 inches (188 x 267 mm)

The weight and construction quality of envelopes can vary widely. While many envelopes work well with the envelope cassette and the LaserWriter printer, some do not. Before you buy large quantities of any envelope, print some samples to make sure they work well with the LaserWriter.

!! IMPORTANT: When you print envelopes, use the face-up delivery tray to receive the printed results. For instructions on opening the tray, see "Choosing Face-Up Delivery," later in this chapter. !!

Before you print on envelopes, choose Page Setup from the File menu. (You

need to modify your page setup to accommodate envelopes.)

Printing from the multipurpose tray

As its name suggests, you can use the multipurpose tray for more than one purpose:

- Automatic printing

- Manual feed printing

- Two-sided printing

Opening and adjusting the multipurpose tray. Opening the multipurpose tray is the same any time you use it. How you adjust the tray depends on what kind of paper or envelope you plan to print on.

Adjust the multipurpose tray extension to suit your needs. (Your paper should rest on the tray without sticking out over the edge.)

Automatic printing. The multipurpose tray is useful for small automatic printing jobs when you want to use paper that's different from the paper in your paper cassette. For example, you might keep standard typewriter bond in the paper cassette and a small stack of letterhead paper in the multipurpose tray.

!! IMPORTANT: Any time you want to print from the multipurpose tray, you must select Manual Feed in the Print dialog box. !!

The next four illustrations will help you orient paper and envelopes correctly in the multipurpose tray.

!! IMPORTANT: When you print envelopes, use the face-up delivery tray to receive the printed results. For instructions on opening the tray, see "Choosing Face-Up Delivery," later in this chapter. !!

Manual feed printing. When you want to print on special materials, including sheets of labels or transparencies, use the manual feed feature of the multipurpose tray.

!! IMPORTANT: Any time you want to print from the multipurpose tray, you must select Manual Feed in the Print dialog box. !!

The next five illustrations will help you orient paper and envelopes correctly in the multipurpose tray.

!! IMPORTANT: When you print envelopes, labels, and overhead transparencies, use the face-up tray. (This helps avoid paper jams and curling.) For details on opening and using the tray, see "Choosing Face-Up Delivery," later in this chapter. !!

!! IMPORTANT: When you print envelopes, labels, and overhead transparencies, use the face-up tray. (This helps avoid paper jams and curling.) For details on opening and using the tray, see "Choosing Face-Up Delivery," later in this chapter. !!

Two-sided printing. To print two-sided documents, use the multipurpose tray.

!! IMPORTANT: Any time you want to print from the multipurpose tray, you must select Manual Feed in the Print dialog box. !!

1. Print the first side of the page.

2. Place the printed page in the multipurpose tray, printed side up, with the top of the page toward the printer.

3. Print the second side of the page.

Closing face-up delivery

Most of the time, face-down delivery (the standard delivery method) will serve your needs. If necessary, however, you can choose to have printed pages delivered face up.

!! IMPORTANT: When you print envelopes, labels, or overhead transparencies, you need to use the face-up tray. (This helps avoid paper jams and curling.) !!

Opening the face-up tray

1. Open the multipurpose tray; then lift the latch to release the face-up tray.

Hold your other hand under the tray to support it.

2. Lift the face-up tray up and out.

3. Raise the tray until it locks into place.

4. Flip open the extension.

Closing the face-up tray

1. Fold in the extension.

2. Lift the tray at an angle and push down firmly to unlock it.

3. Lower the folded face-up tray into position for closing.

4. Close the tray firmly.

CHAPTER 4-WORKING WITH FONTS

This chapter explains how your Macintosh computer and the Personal LaserWriter NT printer use fonts to produce a printed page. The topics covered include:

- Screen fonts, printer fonts, downloadable fonts, and bitmapped fonts

- Examples of the LaserWriter printer fonts

- Using Key Caps to preview screen fonts

In addition, this chapter suggests ways you may obtain additional fonts and

describes how to add fonts to, or remove them from, your System file.

How printing works

Although choosing Print to print a document is a simple procedure, printing a Macintosh document on a LaserWriter printer involves a complex, multistep process. This section describes the printing process from the computer's point of view. You don't need to know this information, but it might help you understand your printer's behavior.

You create a document using screen fonts. Screen fonts reside in the System file and contain information the system needs to display text on a Macintosh screen. Fonts in menus and fonts you add to or remove from your System file are screen fonts.

As soon as you choose the Print command, the LaserWriter printer driver looks at the document on your screen and begins to convert it to the PostScript page-layout language that the LaserWriter understands.

The printer driver matches screen fonts with available printer fonts. The printer driver first checks to see what fonts are built into the printer. Each time it encounters a new screen font in the document, the driver checks to see whether a matching printer font is stored in the printer.

Printer fonts are stored in the LaserWriter's permanent read-only memory (ROM) in the form of mathematical formulas. Because the fonts are stored in the printer, access to them is quick. Because they are stored as mathematical formulas, the PostScript program can process the information quickly and accurately.

When a screen font and printer font match, the driver tells the printer to use that font, and the printer prints the text. Built-in fonts let the LaserWriter print more efficiently.

Samples of LaserWriter printer fonts: Later in this chapter you'll find samples of the 12 printer fonts built into your LaserWriter printer.

Next, the printer driver matches screen fonts with downloadable fonts. Like printer fonts, a downloadable font is stored as a mathematical formula, but it is not stored in the printer's memory. Instead, it is kept inside the System Folder on a disk. If a screen font doesn't match any of the available printer fonts, the printer driver searches for matching downloadable fonts on disks in your disk drives.

When the printer driver finds a match between a screen font and a downloadable font, it sends the font to the printer (a process called downloading). Stored in the printer's temporary memory (random-access memory), the font acts just like a printer font.

Downloading fonts adds to the time it takes to print your document.

When all else fails, the printer driver creates bitmaps of screen fonts. If the printer driver can't find a printer font or a downloadable font that matches the screen font you've used, it converts the image on the screen into a dot-by-dot representation (bitmap) for the LaserWriter to print.

Bitmaps have two drawbacks:

- Because the screen font is not a mathematical formula, it takes longer to compute and print the image.

- Resolution on the screen makes use of only 72 dots per inch (dpi) to communicate information. The LaserWriter printer uses a much higher resolution of 300 dpi. In other words, the screen image doesn't take full advantage of the printer's capability. Bitmapped images, when printed, have rough edges and bumpy curves.

For example, here are two sentences printed with the same font:

This is 14-point Times printed with the Times printer font built into the printer.

You can use the smoothing option in the Page Setup dialog box to improve the appearance of text printed without a printer font. But the print quality will not equal what you get when you print with a printer font.

This section has described some benefits of using screen fonts that have matching printer fonts. In the next section you'll see samples of the printer fonts that are built into your LaserWriter printer.

The LaserWriter printer fonts

The 12 font families built into your printer's permanent, read-only memory (ROM) should satisfy most of your printing needs.

Although there are thousands of type designs, all Latin alphabet font families can be classified as either serif or sans serif.

Serifs, the strokes at the ends of letterforms, are not just for decoration. Serifs guide the eye along the printed line, increasing legibility.

The LaserWriter comes with six serif fonts: ITC Bookman, Courier, New Century Schoolbook, Palatino, Times, and ITC Zapf Chancery.

ITC Bookman

ITC Bookman is a classic font family for text. It's easy to read because even large quantities don't look crowded. Here is the character set for 12-point ITC Bookman:

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

--"'

Courier

Courier is the only monospaced LaserWriter font. In a monospaced font, each letter occupies the same amount of space on the line. The other LaserWriter

fonts are all proportionally spaced, meaning that different letters are assigned different spacing according to their size and shape.

Compare the lengths of the two strings shown here.

Courier: ITC Bookman:

iiii   iiii mmmm   mmmm

Here is the character set for 12-point Courier:

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Courier is included in the LaserWriter font set because some applications will not print using other fonts, and because it is widely used for computer code. It's also the right choice if you want your correspondence to look as if it were produced on a typewriter.

New Century Schoolbook

Like ITC Bookman, New Century Schoolbook is a highly readable font design. As the name suggests, it was originally developed for school textbooks. Here is the character set for 12-point New Century Schoolbook:

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Palatino

If you want a formal, weighty look -- in a proposal or an annual report, for example -- Palatino is an excellent choice. It is dignified but easy to read. Here is the character set for 12-point Palatino:

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Times

The Times font family is a standard choice for newspapers and other periodicals. Attractive and easy to read, its compact design makes it ideal when space is at a premium. Here is the character set for 12-point Times.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./ \

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

ITC Zapf Chancery

ITC Zapf Chancery is more of a specialty font than a true serif style. It is designed to look handwritten, so it's ideal for a calligraphic appearance. Here is the character set for 12-point ITC Zapf Chancery.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Sans serif fonts

Sans serif means "without serifs." These fonts are characterized by simple, striking lines that make them particularly appropriate for titles and headings, or wherever large type is needed. They are also well adapted to spreadsheets and charts. Some designers like the clean, modern look they give to text, but the serif styles are probably more readable in large quantities.

The LaserWriter sans serif fonts are ITC Avant Garde, Helvetica, and Helvetica Narrow.

ITC Avant Garde

The geometric, symmetrical appearance of ITC Avant Garde makes it a popular choice for display text. Here is the character set for 12-point ITC Avant Garde:

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Helvetica

Helvetica is more compact and somewhat less stylized than ITC Avant Garde. It is probably the most widely used sans serif design in the world. Here is the character set for 12-point Helvetica.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./ \

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Helvetica Narrow

Helvetica is a compact design. Helvetica Narrow is even more so. Because it is highly legible and has an especially clear number set, it is an ideal choice for spreadsheets. Here is the character set for 12-point Helvetica Narrow.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

`•-"'

-- "'

Specialty fonts

The LaserWriter font file also includes three specialty fonts: Symbol, ITC Zapf Dingbats, and IBM PC Graphics Extended Character Set (ECS).

Symbol

The Symbol font is most useful if your work involves science or mathematics. Here is the character set for 12-point Symbol.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

•–"'

-- "'

ITC Zapf Dingbats

You can use ITC Zapf Dingbats to create decorative borders, add icons for emphasis, and give extra punch to text lists. Here is the character set for 12-point ITC Zapf Dingbats.

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

`1234567890-=[];',./\

~!@#$%^&*()_+{}:"<>?|

•–"'

-- "'

IBM PC Graphics Extended Character Set (ECS)

This is a collection of special characters that allow MS-DOS computers to produce graphics from the keyboard. The character set comes in plain and bold styles. Here is the ECS character set.

Using Key Caps to see screen fonts

The Key Caps desk accessory lets you look at the characters in each of the screen fonts installed in your System file. This section tells you how.

1.   Choose Key Caps from the Apple menu.

The keyboard template that appears matches the layout of your keyboard.

2.   To try out characters, type on your keyboard or click Key Caps keys on the screen.

Obtaining additional fonts

In addition to the fonts available from Apple, you can obtain Macintosh fonts from numerous software developers. You can choose from a wide variety of alphabet fonts, both Latin and non-Latin, symbol fonts for specialized purposes, and novelty fonts for display and decoration.

Commercial sources, shareware, and freeware. You can obtain new fonts from a wide variety of commercial sources. You can also choose from a huge array of

public domain fonts. Some of these are freeware. You can use them with no obligation to anyone. Others are shareware. There is no purchase price, but if you continue to use the font, you're honor-bound to pay the developer either a stipulated fee or a donation.

Adding/removing screen fonts.   Some fonts you obtain come with special instructions for installing them. If yours don't, you can use the instructions in this manual. See "Installing Fonts" in Chapter 2.

CHAPTER 5-MAINTENANCE

The Personal LaserWriter NT is designed for trouble-free service. Maintenance involves replacing the toner cartridge when it runs out, using the Cleaning Page, and refilling the paper cassette.

For other service, contact your authorized Apple dealer.

Safety first

Follow these safety tips to avoid damage to the LaserWriter printer and harm to you and other users.

- Don't open the drum protection shutter on the toner cartridge. (The drum is sensitive to light.)

- Don't leave the access door open. (Exposing the toner cartridge to light may damage the cartridge.)

- Don't use oil inside the LaserWriter printer.

- Don't attempt to disassemble the printer.

- Don't place anything on top of the printer (where it would block delivery of printed pages).

- Don't use ammonia-based cleaners on or around the printer (they may react with the toner).

Replacing the toner cartridge and using the Cleaning Page

Each toner cartridge should yield about 3500 pages. If you print a lot of graphic images, you may need to change cartridges more often. If pages start to look too light, or you see thin white lines in dark images, it's time to change the cartridge. Be sure to use cartridges designed for the Personal LaserWriter printer.

1.   Remove and discard the used cartridge.

To avoid spilling leftover toner, keep the cartridge horizontal.

2.   Unpack the new toner cartridge and gently rock it to distribute the toner inside.

3.   Grab the tape tab and remove the tape.

4.   Insert the cartridge into the LaserWriter printer.

Line up the arrow on the cartridge with the arrow inside the LaserWriter.

5.   Close the access door.

If the door will not shut, the gears may not have meshed properly to receive the toner cartridge. See "Access Door Won't Shut" in Chapter 6, "Troubleshooting."

Once you've installed a new toner cartridge, there is a simple cleaning procedure you must perform. To do this you print a document named Cleaning Page. You'll find the Cleaning Page on the Personal LaserWriter NT Installation Disk, or you may already have copied it to your hard disk.

6.   Select the document named Cleaning Page and choose Print from the File menu.

7.   In the dialog box that appears, click OK.

8.   Place the printed page face up in the multipurpose tray.

You're going to print on the second side of this page.

9.   With the Cleaning Page selected, choose Print from the File menu.

10.   In the Print dialog box, click Manual Feed, then click OK.

That's all there is to it! Discard the printed page.

Refilling the paper cassette

The paper cassette holds up to 250 sheets of paper. When there is no paper left in the tray, the yellow Paper Out light will come on.

1.   Pull the paper cassette out of the printer.

2.   Refill the paper cassette.

3.   Replace the paper cassette inside the printer.

Cleaning the exterior

Before you clean the LaserWriter printer, turn it off and unplug the power cord. Then wipe the exterior of the printer with a clean, soft, damp cloth. Use a mild soap or detergent if necessary, but never an ammonia-based cleaner. Be careful not to get any liquid in the power cord port.

!! WARNING: Never use ammonia-based cleaners on or around the LaserWriter printer. Such cleaners may react chemically with the toner. !!

CHAPTER 6-TROUBLESHOOTING

This chapter provides solutions to some common problems that you might encounter while using your LaserWriter printer.

In general, as long as you follow the maintenance instructions in Chapter 5,

you're not likely to have any problems with your LaserWriter printer. The most common source of trouble is faulty software installation. To avoid these problems, follow the instructions in "Installing LaserWriter and Laser Prep" and "Installing Fonts" in Chapter 2.

!! IMPORTANT: If you have a problem with your LaserWriter printer and nothing you do solves it, contact your authorized Apple dealer. !!

Safety first

Follow these safety tips to avoid damage to the LaserWriter printer and harm to you and other users.

The fixing assembly in the LaserWriter operates at very high temperatures. Be careful while performing routine maintenance and troubleshooting chores.

Chooser problems

You use the Chooser desk accessory to identify the printer you intend to use. You also use the Chooser to select a printer on a different network or in a different zone.

The Chooser doesn't show the LaserWriter printer icon. If the LaserWriter icon is missing from the box that identifies different printer types, you probably need to install the appropriate printer software in your System Folder.

You'll find the LaserWriter and Laser Prep icons on the Personal LaserWriter NT Installation Disk. You need to copy both of these icons to the System Folder on your startup disk. See "Installing LaserWriter and Laser Prep" in Chapter 2 for details.

The Chooser doesn't show the name of a LaserWriter printer. If you have selected the Personal LaserWriter printer icon in the Chooser, but the Macintosh doesn't recognize the printer, one of the following may be the cause.

- The printer has been turned off. Make sure it is plugged in and turned on, and wait for the startup page to print.

- The pushwheel switch is not set correctly. See Appendix A, "Ports, Status Lights, and Switches," for more information.

- There's a problem in the LocalTalk cable system somewhere between your computer and the LaserWriter you want to use.

Check to make sure that all the cables are properly connected. See Chapter 1, "Setting Up the Personal LaserWriter NT," or if appropriate, see Appendix D, "Connecting to an Apple II," or Appendix F, "Connecting to and Printing With an MS-DOS Computer."

If your printer is part of a network, check the LocalTalk cable system. See the LocalTalk Cable System Owner's Guide or contact your network administrator.

- Someone on the network may have changed the name of the printer. Check with other users.

If you still can't resolve the problem, the printer's electronics or the LocalTalk connector boxes may not be functioning properly. Contact your authorized Apple dealer.

The LaserWriter won't print a startup page

Unless you change the PostScript parameters, the LaserWriter prints a startup page every time you turn it on. If it doesn't, the paper cassette may be empty, or there might be a paper jam. Check the status lights. If the printer is out of paper, see "Refilling the Paper Cassette" in Chapter 5. If the Paper Jam light is lit, see "Paper Is Jammed" later in this chapter.

The startup page is blank

Check the toner cartridge. You may be completely out of toner, or the powder may simply need redistribution. If you have just changed the cartridge, check to make sure that you have removed the sealing tape. (See "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5.)

The LaserWriter won't print a particular document

If you attempt to print a document but no page appears, try the following steps.

1. Check for messages on your Macintosh screen.

If someone else is currently using the printer, or if the paper cassette is empty, you will see a message.

If anyone on the network is using the wrong printer software, you'll see a message instructing you to reinitialize the printer. Everyone on the network must use the same printer software.

2. Repeat the printing process.

Select the LaserWriter in the Chooser, and respond to any dialog boxes; choose Print from the File menu and confirm the settings in the Print dialog box.

3. Check the status lights.

If the printer is out of paper, see "Refilling the Paper Cassette" in Chapter 5.

If the Paper Jam light is lit, see "Paper Is Jammed" later in this chapter.

See also "The Status Lights Indicate a Problem" later in this chapter and Appendix A, "Ports, Status Lights, and Switches."

Paper is jammed

Occasionally a piece of paper may get stuck inside of the printer during the printing process. Here's how to clear a paper jam:

1. Open the printer to see where the jam is.

2. Clear the jam.

The next four illustrations will help you find and remove the paper.

Paper feeds improperly

If paper tears, gets skewed, or comes through the printer crumpled, it may not be feeding properly.

1. Try to recover any torn or otherwise damaged pieces of paper from inside the printer.

See the previous section, "Paper Is Jammed."

2. Open the paper cassette, take out the paper, and flip the stack over.

Most paper has one side that prints better. Try flipping the paper to see whether that will improve paper feeding.

3. Make sure the stack of paper lines up evenly.

The LaserWriter is hung up

Sometimes a printer becomes "stalled." It's plugged in, you have all the correct software, the paper cassette is full, there's no paper jam, and still nothing prints. A problem on the AppleTalk network might be the cause. A simple remedy is to turn the printer off, wait 10 seconds, and turn it back on. If it prints a startup page (as it should), the problem has been resolved successfully.

The status lights indicate a problem

Sometimes the status lights can signal a problem with the printer. The following list describes these indications and tells you what you should do about them:

- All lights are off. Check to make sure the power cable is plugged in properly. Also make sure the printer is turned on. If the lights stay off, it means that the controller board is not receiving power from the printer's engine. Contact your authorized Apple dealer and describe the situation.

- All lights are on. This probably means that the controller board is not working at all. Contact your authorized Apple dealer and describe the situation.

- The Paper Out and Paper Jam lights flash simultaneously. This can occur when you turn on the printer or when you try to print a document. When the yellow lights flash together, the printer's engine needs service. Contact your authorized Apple dealer and describe the situation.

- The Paper Out and Paper Jam lights flash alternately. This occurs when you turn on the printer, and it means that the controller board needs service. Contact your authorized Apple dealer and describe the situation.

Image problems

Most of these result from problems with the toner cartridge or with your choice of paper.

Here is a list of papers to avoid:

- Extremely slick or shiny paper

- Paper that is highly textured

- Coated paper

- Damaged or wrinkled paper

- Stapled paper

- Multipart forms

- Letterhead paper that was printed using low temperature dyes or thermography. (Such materials can peel away from the paper or melt inside the LaserWriter and cause damage.)

Image is too light or too dark. If printing is too light or too dark, try the following:

- Rock the toner cartridge to distribute toner. If this doesn't help, you may need to replace the cartridge. See "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5 for instructions.

- Adjust the print density setting to make the image you print lighter or darker.

- If the problem occurred on nonstandard paper, try printing on the recommended 20-lb. photocopy or typewriter bond paper. If print quality improves, that means the toner does not adhere well to the nonstandard paper you were using.

Toner smears when rubbed. If the problem occurs on nonstandard paper, try printing on the recommended 20-lb. typewriter or photocopy bond paper. Other paper may not hold the toner as well, and smearing can result.

A page prints solid black. If you try printing a document but get a solid black page out of the printer, you need to replace the toner cartridge. See "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5 for instructions.

A page prints off center or images are out of place. This problem may result from one of the following:

- You are not using the recommended paper (20-lb. typewriter or photocopy bond).

- The paper cassette is too full.

- Paper is not arranged correctly in the cassette. (See "Paper Feeds Improperly" earlier in this chapter.)

- The margins are set wrong in the document you are printing.

Nothing prints on the paper. If you get a blank page, make sure that the sealing tape has been removed from the toner cartridge. (For details, see "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5.)

If the toner cartridge has been used for a long time, it may be nearly empty. Replace the cartridge.

Unwanted lines or stripes appear. If white or dark lines appear on the page, try the following:

- Remove the toner cartridge and rock it to redistribute the toner. Be sure to hold the cartridge horizontally.

- If redistributing the toner doesn't work, install a new toner cartridge. See "Replacing the Toner Cartridge and Using the Cleaning Page" in Chapter 5.

The printer only prints on part of the paper. Make sure that you have selected the appropriate paper size in the Page Setup dialog box. If you want to print on more of the page, you can select Larger Print Area in the Options portion of the Page Setup dialog box.

Toner may need to be redistributed. Remove the toner cartridge and gently rock it from side to side to redistribute the toner. Then put the cartridge back in place.

Stains appear on the backs of printed pages. If stains appear on the backs of printed pages, use the Cleaning Page to clean excess toner from the interior of the LaserWriter. To do this you print a document named Cleaning Page. You'll find the Cleaning Page on the Personal LaserWriter NT Installation Disk, or you may already have copied it to your hard disk.

1. Select the document named Cleaning Page and choose Print from the File menu.

2. In the dialog box that appears, click OK.

3. Place the printed page face up in the multipurpose tray.

You're going to print on the second side of this page.

4. With the Cleaning Page selected, choose Print from the File menu.

5. In the Print dialog box, click Manual Feed, then click OK.

That's all there is to it! Discard the printed page.

Documents are not being delivered to the face-up tray. If the face-up tray is open but printed pages are not being delivered to it, you need to reset the tray. Simply close and reopen the tray. For detailed instructions, see "Closing the Face-Up Tray" and "Choosing Face-Up Delivery" in Chapter 3.

Image prints wavy or distorted. Wavy or distorted images usually mean your LaserWriter requires service. Contact your authorized Apple dealer.

Access door won't shut

If you are unable to shut the access door, the toner cartridge may not be seated properly. (There are some gears involved, and on rare occasions they don't mesh.) To fix the problem, follow these steps:

1. Open the access door.

2. Pull the toner cartridge out of the printer.

3. Push the colored button inside the printer and hold it down as you insert the toner cartridge.

4. Close the access door.

APPENDIX A-PORTS, STATUS LIGHTS, AND SWITCHES

Ports

The Personal LaserWriter NT has two ports:

- The 25-pin serial port is for non-LocalTalk serial connections.

- The LocalTalk port is for connecting to any computer using a LocalTalk cable system.

Status lights

There are three status lights on the front panel of the Personal LaserWriter:

- The Ready/In Use light flashes during warmup and while printing. Otherwise it glows green steadily (unless there is a paper problem).

- The Paper Out light flashes when the LaserWriter is ready to accept manually fed paper. When the paper cassette is empty or is not in place, the light glows steadily.

- The Paper Jam light glows steadily when there is a paper jam and continues to glow until the jam is cleared.

LaserWriter switch configurations

The Personal LaserWriter NT has an eight-position pushwheel switch that allows you to configure the printer to work in different environments. For details, see Appendix F, "Connecting to and Printing With an MS-DOS Computer."

Never change the switch setting while the printer is connected to an AppleTalk network.

!! WARNING: Before you change the pushwheel switch setting, be sure to turn off the printer and disconnect the LocalTalk connector box. If you change a setting while the printer is connected to an AppleTalk network, you can do permanent damage to communication on the network.   !!

APPENDIX B

SPECIFICATIONS AND PARTS LIST

Marking engine. Canon P-110 laser-xerographic.

Controller. The LaserWriter controller hardware contains a 12 MHz 68000 CPU, 2 MB of ROM, 2 MB of RAM, LocalTalk interface, and RS-232 serial interface.

Print quality. 300 dots per inch for text and graphics.

Built-in printer fonts.   ITC Avant Garde, ITC Bookman, Courier, Helvetica, Helvetica Narrow, New Century Schoolbook, Palatino, Symbol, Times, ITC Zapf Chancery, ITC Zapf Dingbats, and IBM PC Graphics Extended Character Set (ECS).

The LaserWriter supports printing in plain, bold, italic, and bold italic, with additional styles depending on the application. Font sizes are limited only by the resolution of the printer and the size of the paper.

Additional fonts. The Personal LaserWriter NT can support additional PostScript fonts, whether from Apple or from other suppliers.

Speed.   Four pages per minute maximum. Actual speed depends on the images printed.

Interfaces. LocalTalk, RS-232, and RS-422.

Recommended duty cycle. Minimum life expectancy is 150,000 pages, with no monthly page limit.

Paper feed. Automatic with paper cassette (up to 250 sheets). Manual or automatic (up to 50 sheets or 5 envelopes) with multipurpose tray.

Printing materials. Apple recommends 20-lb. photocopy or typewriter bond (75 g/m2). You can use 16-lb. (60 g/m2) to 28-lb. (105 g/m2) paper. Accepts most letterhead and colored stock. Accepts medium-weight photocopier transparencies. Print labels from the multipurpose tray using manual feed.

Use envelopes recommended for laser printers. Print envelopes from the multipurpose tray with automatic or manual feed or automatically from the optional envelope cassette.

Paper sizes and capacity. Supports U.S. letter, U.S. legal, A4, B5 (Japanese Industry Standard), and envelope cassettes. Each paper cassette holds 250 sheets of 20-lb. (75 g/m2) paper.

Envelope cassette holds up to 15 envelopes. Use only envelopes whose size falls within these ranges:

- Minimum: 86 x 178 mm (3.5 x 7 in.).

- Maximum: 188 x 267 mm (7.4 x 10.5 in.).

Imageaaaable area.   Maximum printable line: 205.9 mm (8.1 in.).Minimum top and bottom margins: 6.0 mm (0.235 in.).Minimum left margin: 5.0 mm (0.197 in.).Minimum right margin: 5.0 mm (0.197 in.).

The printer senses cassette size and adjusts to maintain these margins. In the manual feed or envelope cassette mode, the operator must prevent printing beyond the margin to avoid depositing toner on the transfer roller or scraping toner from the drum.

Actual imageable area may vary depending on the application.

Dimenstions

Height   24.8 cm (9.8 in.)

Width	38 cm (15 in.)
Depth with letter-size cassette	46.4 cm (18.3 in.)
Weight	15 kg (32 lb.)
Operating environment	
Temperature	10 to 32 C (50 to 90 F)
Humidity	20 to 80 percent noncondensing
Toner cartridge transit environment	-20 to +40 C (-4 to +104 F)
Input	
U.S./Japan	100/115 V (+/-10%), 50/60 Hz (+/-2 Hz)
Europe/Australia	220-240 V (+/-10%), 50 Hz (+/-2 Hz)
Power consumption	
Operating	600 W maximum at 115 V 550 W maximum at 220 V

Parts list

This list includes options.

- Personal LaserWriter NT

- Personal LaserWriter EP-L toner cartridge

- Personal LaserWriter U.S. letter cassette

- Personal LaserWriter U.S. legal cassette

- Personal LaserWriter A4 cassette

- Personal LaserWriter B5 cassette

- Personal LaserWriter envelope cassette

- LocalTalk Locking Connector Kit

- LocalTalk Locking Cable Kit

- LocalTalk Custom Wiring Kit

APPENDIX C

HOW THE LASERWRITER WORKS

The Personal LaserWriter NT is a laser printer. It uses laser light, electric
charges, and plastic toner to produce each finished page of text and

graphics.

When you give the Print command on your Macintosh, the computer sends a description of the page through the LocalTalk cable system to the printer. It is sent in PostScript, the language the printer uses to recreate the page.

The internal computer in the LaserWriter uses these commands to create a full-page bitmap, a dot-by-dot "guide" to each letter or image. The LaserWriter then activates the laser, and the pulses of the beam match the map dot for dot.

Through a series of mirrors, the laser light is reflected onto a rotating photosensitive drum. The drum has a negative charge. When the laser light scans the drum, it gives what will turn out to be printed areas a neutral charge, leaving the surrounding areas negative.

The toner is also negatively charged. The drum rotates through it, and the toner particles stick to the neutral (black) areas but avoid the negative (white) areas.

Paper acquires a positive charge when it enters the printer. Opposites attract, so the negatively charged toner jumps onto the paper when the drum rotates over it.

The paper then passes through the fixing rollers, which generate a temperature of about 350 degrees Fahrenheit (177 degrees Celsius) to fuse the dots onto the paper.

The LaserWriter forms 300 dots per inch (90,000 dots per square inch), or about 7.6 million dots per page. That's why your finished copy looks as good as it does. And once the printer has the bitmaps in its memory, it can produce page after page at a rate of about four per minute.

APPENDIX D

CONNECTING TO AN APPLE II

Connecting an Apple II computer to a Personal LaserWriter NT involves these steps:

1.   Connecting the cables

2.   Setting the Control Panel (Apple IIgs computer users only)

3.   Installing the LaserWriter update (Apple IIgs users only)

4.   Naming the LaserWriter

5.   Installing fonts (Apple IIgs users only)

6.   Choosing the printer

This appendix provides a quick summary of the necessary steps. For more detailed instructions, see the documentation that came with your computer and system software.

Connecting the cables

Here are the general steps for connecting the printer to your Apple II
computer. For more detailed instructions, see the manuals that came with your
computer, system software, and (for Apple IIe users) Apple II Workstation
Card.

Setting the Apple IIgs Control Panel

If you are connecting the LaserWriter to an Apple IIe, you must first install
the Apple II Workstation Card. See the Apple II Workstation Card Owner's
Guide for instructions.

To connect the LaserWriter to an Apple II computer:

1.   Make sure both the printer and the computer are switched off.

2.   Plug a LocalTalk connector box into the LocalTalk port on the
LaserWriter. (The LocalTalk port is on the right side of the connector
panel.)

3.   Plug a second connector box into the AppleTalk port on the workstation
card installed in your Apple IIe, or into the printer port on your Apple
IIgs.

If the printer port on your Apple IIgs is already in use, you may connect the
connector box to the modem port instead.

4.   Connect the two connector boxes with a LocalTalk cable.

If you are connecting the LaserWriter to an Apple IIe, you can skip these
steps. Turn to "Naming the LaserWriter" later in this appendix.

If you are connecting the LaserWriter to an Apple IIgs computer, the next
step is to set the Control Panel to use AppleTalk software. There are two
versions of the Apple IIgs (ROM 01 and ROM 03) and they have slightly
different setup procedures.

If you are not sure which version of the Apple IIgs you have, watch the
bottom of the screen as you start up or restart the computer.

Apple IIgs (ROM 01)

1.   Open the Control Panel.

See the Apple IIgs Owner's Guide for detailed instructions.

2.   Choose Slots from the Control Panel menu.

3.   Set Slot 1 to Your Card.

If you connected the LocalTalk connector box to the modem port instead, set
Slot 2 to Your Card, and set Slot 1 to Printer Port.

!! IMPORTANT: If you want to use the modem port for AppleTalk, you must set
slot 1 to Printer Port and slot 2 to Your Card. If slot 1 is set to Your
Card, you must use the printer port for AppleTalk. See the documentation that
came with your computer for more information.   !!

4.   Set Slot 7 to Built-in AppleTalk.

Although the LaserWriter is physically connected to slot 1 (the printer port) or slot 2 (the modem port), the Apple IIgs now acts as though the printer were connected to slot 7.

5.   Choose Printer Port from the Control Panel menu.

If you connected the LocalTalk connector box to the modem port instead, choose Modem Port from the Control Panel menu.

6.   Set Devices Connected to Printer.

7.   Set Add LF after CR to Yes.

8.   Close the Control Panel and restart your computer.

Apple IIgs (ROM 03)

1.   Open the Control Panel.

See the Apple IIgs Owner's Reference for detailed instructions.

2.   Choose Slots from the Control Panel menu.

3.   Set Slot 1 to AppleTalk.

If you connected the LocalTalk connector box to the modem port instead, set Slot 2 to AppleTalk.

4.   Set Add LF after CR to Yes.

5.   Close the Control Panel and restart your computer.

Installing the Apple IIgs LaserWriter update

If you are using a version of Apple IIgs system software older than version 4.0 or if you are connecting the LaserWriter to an Apple IIe, you can skip this step. Go to the next section, "Naming the LaserWriter."

If you are an Apple IIgs user, the next step is to use the Installer to install the LaserWriter update on your startup disks. See the documentation that came with your computer and system software for details on using the Installer.

Naming the LaserWriter

If your AppleTalk network system includes more than one LaserWriter printer, you'll want to give each one a distinguishing name. These names appear in different places, depending on which computer and system software you are using:

- On the Apple IIgs with 5.0 system software, you'll find printer names in the Control Panel. Just click the LaserWriter icon.

- On an Apple IIgs with versions of system software earlier than 5.0, the names are in the dialog box that appears when you choose Choose Printer from the File menu of an application.

- On an Apple IIe, printer names appear in the Chooser.II application.

- On a Macintosh, the names appear in the Chooser desk accessory.

Opening the Namer

The first step in naming your printer is to open the Namer application. How you do that depends on what kind of computer you have.

Apple IIe users

If you are using an Apple IIe, follow these steps:

1. Start up the Apple IIe with the Apple II Workstation Card disk.

2. Select Printer Namer from the menu.

This starts the Namer.II application.

3. Go to the section called "Using the Namer."

Apple IIgs users

If you are using an Apple IIgs, follow these steps:

1. Start the Apple IIgs with a startup disk.

If you haven't installed the Namer on your startup disk, use the System.Tools disk.

If you are using a version of Apple IIgs system software older than version 4.0, you need to use the Apple IIgs Workstation Disk.

2. Open the Namer folder on the startup disk.

If you are using a version of system software older than version 5.0, open the AppleTalk folder.

3. Open the Namer.II application.

If you are using a version of system software older than version 4.0, open the Namer application.

4. Go to the next section, "Using the Namer."

Using the Namer. Once the Namer is open, follow these steps to rename the printer:

1. Select the LaserWriter as the device type.

You'll see a list of printers of this type on the right side of the dialog box.

2. Select the name LaserWriter from the list on the right.

The printer name automatically moves to the New Name box.

3. Type the new name, and select Accept.

You can use this procedure to name (or rename) all LaserWriter printers on the network. If you change the name of any printer, be sure to tell everyone else who uses the network.

4.   Quit the Namer.II application.

Installing fonts

If you are connecting the LaserWriter to an Apple IIe, this section does not apply to you. Continue reading with the next section, "Choosing the Printer."

If you are using an Apple IIgs you may install additional fonts on your startup disks with the Installer application or you may copy additional fonts into the Fonts folder, which is inside the System folder on the startup disk.

If you are using a version of Apple IIgs system software older than 4.0, you must copy fonts you want to install into the Fonts folder.

See the documentation that came with your computer and system software for details on adding fonts and using the Installer.

Choosing the printer

The next step is to tell your computer which printer to use. Follow the steps for the kind of computer you are using.

Apple IIgs users. If you are using a version of system software older than 5.0, you need to use the Chooser.II application or the Choose Printer command in the File menu of your application to choose the printer. See the manuals that came with your computer, system software, and application software for instructions.

If you are using an Apple IIgs with system software 5.0 or newer, follow these steps:

1.   Start the Apple IIgs with a startup disk that includes the LaserWriter update.

2.   Choose Control Panel from the Apple menu.

3.   Click the LaserWriter icon to select it.

You may have to scroll through the list of icons to see the LaserWriter icon.

4.   If necessary, select the correct AppleTalk zone.

If your network is divided into several AppleTalk zones, choose the zone your printer belongs to by clicking its name.

5.   Select the printer you want to use.

All LaserWriter printers on the network will be listed on the right side of the dialog box. Click the name of the printer you want.

6.   If necessary, click the ImageWriter Emulator button.

If your applications print to the LaserWriter as if it were an ImageWriter

printer, you'll need to download the ImageWriter emulator software before you print. Most applications written for the Apple IIgs do not need the ImageWriter emulator to print on a LaserWriter. Check the documentation for your applications to see if the emulator is required.

You'll see the message "Checking for presence of the ImageWriter emulator." If no one has printed with that LaserWriter since it was last turned on, you'll also see the message "Downloading the emulator," and the printer will print a page informing you that the emulator is installed.

7.   Type your name in the space after User Name.

Your name will automatically appear in the Apple IIgs Control Panel from now on, unless you change startup disks.

8.   Close the Control Panel.

Apple IIe users.   If you are using an Apple IIe, follow these steps:

1.   Start up the Apple IIe with the Apple II Workstation Card disk.

2.   Select the Chooser application from the menu.

This starts the Chooser.II application.

3.   Select LaserWriter as the device type.

4.   If necessary, select the correct AppleTalk zone.

If your network is divided into several AppleTalk zones, select the zone your printer belongs to.

5.   Select the printer you want to use.

All LaserWriter printers on the network will be listed on the right side of the dialog box. Click the name of the printer you want.

6.   Select the ImageWriter Emulator.

You'll see the message "Checking for presence of ImageWriter emulator." If no one has printed with that LaserWriter since it was last turned on, you'll also see the message "Downloading ImageWriter emulator," and the printer will print a page informing you that the emulator is installed.

The ImageWriter emulator allows the Apple II to communicate with the LaserWriter as if it were an ImageWriter.

7.   Type your name in the space after User Name.

Your name will automatically appear in Chooser.II from now on, unless you change workstation disks.

8.   Quit the Chooser.II application.

Printing

Different applications have different procedures for printing and different ways of asking for information about the printer. The owner's guide for the

application should provide full details. The fonts you can print with will also depend on the application.

If your application asks for the printer's slot number, respond according to the kind of computer you have:

- If you are using an Apple IIgs with ROM version 01, specify slot 7.

- If you are using an Apple IIgs with ROM version 03, specify slot 1 or 2 (whichever is set to AppleTalk).

- If you are using an Apple IIe with a workstation card, specify whatever slot the workstation card is in.

APPENDIX B-POSTSCRIPT DOCUMENTS

If you're using an MS-DOS application program that produces PostScript files, be sure to install the program's PostScript printer driver. The printer driver translates your print files into PostScript, the page-description language that the Personal LaserWriter understands.

The installation process varies with the application program. See the manual that came with your application program for instructions.

If you run into trouble producing PostScript documents, make sure you have a version of the program that supports PostScript and that you have the correct version of the printer driver.

Diablo emulation

In Diablo 630 emulation mode, the Personal LaserWriter prints text entirely in 12-point Courier or uses the IBM PC Graphics Extended Character Set (ECS).

This is an example of 12-point Courier. All characters and spaces take up the same amount of space on the line.

The Personal LaserWriter also prints bold characters, when identified by the proper Diablo 630 command sequence (Esc-0), in boldface Courier. Although there is no way for a laser printer to darken a character by double-striking, some MS-DOS applications reinterpret the double-striking command, causing the Personal LaserWriter to darken characters by widening each stroke.

For Diablo 630 emulation on your Personal LaserWriter, set the pushwheel switch at 3. If you use the DSR/DTR handshake, be sure to reset the handshake using the PostScript program specifically designed for changing the parameters for use with Personal LaserWriter Diablo 630 emulation. (See "Checking and Changing the Printer's Parameters" later in this appendix.)

Install the Diablo 630 printer driver on your MS-DOS computer, following the instructions in the manual that came with your application program. You can then print documents as if the Personal LaserWriter were a Diablo 630 printer.

The Personal LaserWriter interprets the Control-D key combination as an end-of-file command. If you can, insert the Control-D character at the end of your file. When the printer receives the Control-D character, it immediately

prints the last page in your document.

If your MS-DOS application program does not allow you to insert the Control-D character at the end of your file, the Personal LaserWriter does not immediately print the last page of a document unless the page is full or ends with a form feed (end-of-page) character. Instead, the page is printed as part of the next document (at the top of the first page). When you're printing documents in close succession, make sure that each one has a final form feed, so they won't run together. If no other document is ready to print, the LaserWriter waits for 30 seconds after last receiving data before it prints the last page.

The following Diablo 630 features are not recognized by the Personal LaserWriter NT:

- HY-plot

- the ability to download information for print wheels, including program mode

- the ability to override print-wheel spacing (for proportional spacing), although the offset between characters can be changed

- hammer energy control

To print documents that use the IBM PC Graphics Extended Character Set (ECS), you must first send to the printer a PostScript program that turns on the ECS. Type these lines at the DOS prompt, then press Enter:

copy con set.ecs serverdict begin 0 exitserver statusdict begin DiabloDefaults /ecs true put save DiabloDefaults^Z

Note: To type ^Z, press and hold the Control key while you press the Z key, and then release both keys together.

When you press Enter, you save the program in a file named SET.ECS.

To send the PostScript program to the printer, type this line at the DOS prompt, and press Enter:

copy SET.ECS COM1

If the LaserWriter is connected to the serial port you identify as COM2 on your computer, substitute COM2 for COM1 in the command.

This program turns on the ECS permanently (or until you send a similar program, replacing the word true with the word false in the fourth line).

LaserJet Plus emulation

In HP LaserJet Plus emulation mode, the Personal LaserWriter can print text and bitmapped graphics using the LaserJet's font selection and positioning commands.

For LaserJet Plus emulation on your LaserWriter, set the pushwheel switch at 2.

Install the LaserJet Plus printer driver on your MS-DOS computer, following

the instructions in the manual that came with your application program. You can then print documents as if the Personal LaserWriter NT were a LaserJet Plus printer.

The LaserWriter interprets the Control-D key combination as an end-of-file command. If you can, insert the Control-D character at the end of your file. When the printer receives the Control-D character, it immediately prints the last page in your document.

If your MS-DOS application program does not allow you to insert the Control-D character at the end of your file, the LaserWriter does not immediately print the last page of a document unless the page is full or ends with a form feed (end-of-page) character. Instead, the page is printed as part of the next document (at the top of the first page). When you're printing documents in close succession, make sure that each one has a final form feed, so they won't run together. If no other document is ready to print, the LaserWriter waits for 30 seconds after last receiving data before it prints the last page.

The LaserJet Plus emulator of the LaserWriter allows you to print just about anything you could print on the LaserJet Plus, but there are a few minor differences:

- The LaserJet Plus omits characters that overlap the left margin of the paper, but the emulator prints the portion of the character that does not extend into the margin.

- The LaserJet Plus allows you to insert commands to halt printing so that you can insert paper or envelopes manually. The emulator interprets such commands as form feeds.

- Applications that produce justified text with the LaserJet Plus versions of Helvetica (Helv) and Times Roman (Tms Rmn) fonts may generate slightly ragged output on the emulator.

- While the LaserJet Plus prints characters in the closest available point size and pitch for each typeface, the emulator scales the font to the specified size.

- The emulator does not print the following nine characters from the LaserJet Plus Roman-8 symbol set:

Decimal code	Symbol description
176	overline
179	degree symbol
227	uppercase D with stroke (Eth)
228	lowercase D with stroke (eth)
240	uppercase Thorn
241	lowercase thorn
247	one-fourth symbol

248   one-half symbol

254   plus/minus sign

- The line printer font, which is 16.67 pitch Courier, appears with a height
of 7.2 points when printed with the emulator, rather than 8.5 points as
printed by the LaserJet Plus.

- The Control-C and Control-T key combinations, which you can normally use to
interrupt printing or query the status of the LaserWriter, cannot be used
with the emulator.

Once you've completed the steps in "Using the Printer's 25-Pin Serial Port,"
try printing some documents. If you experience any problems (now or later),
you may need to make additional adjustments to settings on the printer. There
are two procedures involved:

- Find out how your printer is set.

- Change parameters on the printer.

It is possible to reassign the printer's communications parameters by sending
a program from the computer to the printer. If someone has redefined any of
the parameters in this way, the number on the pushwheel switch won't tell you
much about the settings it represents. That is, the switch may no longer
provide the default communications parameters described below.

If you suspect the settings have been changed, you can print a diagnostic
page that describes what parameters are in effect.

1.   Turn off the printer.

2.   Reset the pushwheel switch to 4.

For information on manipulating the pushwheel switch, see Appendix A, "Ports,
Status Lights, and Switches."

3.   Turn on the printer.

After the printer warms up, it prints a diagnostic page describing the
current parameter settings for each position of the pushwheel switch. If the
settings have not been changed since the printer left the factory, they
should match the default settings listed below.

Switch position   Default parameter setting

0 (or 7)   AppleTalk, PostScript batch mode*

1   Serial 9600, N, std, 1, XON, PostScript batch
mode

2   Serial 9600, N, 8, 1, XON, HP emulation

3   Serial 9600, N, 8, 1, XON, Diablo emulation

4   Serial 1200, N, std, 1, XON, PostScript batch
                 mode*

| 5 | Serial 9600, N, 8, 1, DTR, PostScript batch mode |
| 6 | Serial 9600, N, 8, 1, XON, PostScript binary mode |

*These parameter values are permanent.

If the switch parameters on your printer have been redefined, and your application software doesn't allow you to set matching communications parameters, you can write a PostScript program to change the settings internally. The settings that need to match include:

- data transfer rate

- parity

- data bits

- stop bits

- handshake

Do not modify any switch parameters while your Personal LaserWriter is printing.

Note: Any change you send to the printer affects the comparable parameters for all five switch settings that permit such changes. In other words, if you change the baud rate to 2400, the rate for all five settings that can be changed will be 2400.

In the program example that follows, the words BAUD and OPTIONS appear. Before you type the program, you need to determine what number(s) you want to put in place of the words.

- In place of BAUD, type the data transfer rate, which can be 300, 600, 1200, 2400, 3600, 4800, 9600, or 19200.

- Use Table F-3 to determine the options number. Type that number where OPTIONS appears in the program.

Here is the program you can type:

```
copy con set.pst serverdict begin 0 exitserver statusdict begin 25 BAUD
OPTIONS setsccbatch^Z
```

Finally, press Enter. This saves the commands that change the parameters in a file named SET.PST.

Note: To type ^Z, press and hold the Control key while you press the Z key, and then release both keys together.

Table F-3   The options number

To send the PostScript program to the printer, type this line at the DOS prompt, and then press Enter:

```
copy SET.PST COM1
```

If the Personal LaserWriter is connected to the serial port you identify as COM2 on your computer, substitute COM2 for COM1 in the command.

For another example, see the next section, "A Sample PostScript Program."

A sample PostScript program

Here is a sample program to illustrate how you might change the settings.

copy con set.pst serverdict begin 0 exitserver statusdict begin 25 2400 68 setsccbatch^Z

After typing the program, press Enter.

You would type this program to use the Personal LaserWriter with an application program that required the following parameters:

Parameter	Setting
Data transfer rate	2400 baud
parity check	None
number of data bits	8
number of stop bits	1
handshake	DSR/DTR

To send the PostScript program to the printer, type this line at the DOS prompt, and then press Enter:

copy SET.PST COM1

If the Personal LaserWriter is connected to the serial port you identify as COM2 on your computer, substitute COM2 for COM1 in the command.

The 8-pin connector on the back of the Personal LaserWriter is RS-422 compatible, although most of the time it is used for connection to a LocalTalk network. If you have an RS-422 compatible computer and the appropriate cables and software, you can take advantage of RS-422 capabilities.

If you need to purchase a special cable or have one built for you, Table F-4 provides a description of the pin assignments on the 8-pin port of the Personal LaserWriter NT. The person who builds the cable will need this information.

Table F-4   Pin assignments for the 8-pin port on the Personal LaserWriter NT

Pin	Description
1	HSKo
2	HSKi
3	Transmit data -

4	Signal ground
5	Receive data -
6	Transmit data +
7	GPi
8	Receive data +

The operating modes you can use are the same as for the 25-pin RS-232 connector. See "Using the Printer's 25-Pin Serial Port" earlier in this appendix. Pay particular attention to "Step 3: Selecting an Operating Mode" in that section.

When you finish

If the Personal LaserWriter NT is part of an AppleTalk network system, you may wish to reactivate the printer's AppleTalk software after you have reset the printer, so that computers on the network can use the printer. To do so, follow this procedure:

1. Switch off the printer's power.

2. If necessary, disconnect the LocalTalk connector box.

If you reset the pushwheel switch while the printer is still connected to an AppleTalk network, you can interrupt activity on the network.

3. Set the pushwheel switch to position 0.

4. Reconnect the LocalTalk connector box and cable.

5. Switch on the printer.

APPENDIX C-CONNECTING TO AND PRINTING WITH AN MS-DOS COMPUTER

With the right hardware and software, you can use the Personal LaserWriter NT printer to print a document you've created or stored on an MS-DOS computer -- the IBM PC or any compatible computer. There are two ways to connect your Personal LaserWriter to an MS-DOS computer:

- Install a LocalTalk peripheral card in one of the expansion slots of your MS-DOS computer, connect the computer to an AppleTalk network system, and connect the printer to the same network.

- Connect a serial port on your MS-DOS computer to the 25-pin serial port on your printer.

Using LocalTalk

It is much easier to connect and use a Personal LaserWriter NT when you use a LocalTalk peripheral card in your computer. The LocalTalk card automatically manages communications between your computer and the printer.

Obatining the necessary equipment. To connect a Personal LaserWriter to an MS-DOS computer you need

- a Personal LaserWriter NT

- an MS-DOS or IBM-compatible computer

- an Apple LocalTalk PC Card (or equivalent)

- one Apple LocalTalk Locking Connector Kit (the Din-8 version) to connect to
the LaserWriter

- another Apple LocalTalk Locking Connector Kit (the Din-8 version if your
LocalTalk PC Card has an 8-pin plug; the DB9 version if it has a 9-pin plug)

The Apple LocalTalk PC Card

You can obtain a LocalTalk PC Card from your authorized Apple dealer or
representative. This card is a half-size printed-circuit board that fits into
one of the slots in your computer.

The LocalTalk PC Card comes with the AppleShare PC or PC LaserWriter program,
which allows your computer to work with LocalTalk.

- If your application program produces files in PostScript format, the
AppleShare PC program or PC LaserWriter program lets you send those files
directly to the Personal LaserWriter NT.

- With some application programs, such as Lotus 1-2-3, MultiMate, or
WordStar, the AppleShare PC or PC LaserWriter program lets you specify the
format for each file before printing it on the Personal LaserWriter NT.

- If your application program creates ASCII files (text files), you can print
those files using the AppleShare PC or PC LaserWriter program.

Other LocalTalk peripheral cards

Other suppliers also sell peripheral cards that allow you to install a
LocalTalk port in your MS-DOS computer.

Before installing such a card, make sure it comes with software that allows
you to translate and format your documents for printing on the Personal
LaserWriter NT.

Making the connection. To connect a computer to your Personal LaserWriter NT
through a LocalTalk cable system, follow these steps:

!! WARNING: Before you disconnect or connect anything, make sure the
computer and the printer are switched off. If you have previously connected
the Personal LaserWriter NT to a computer using the printer's 25-pin serial
port, disconnect the serial cable from the printer before you go on.   !!

1. Install a LocalTalk PC Card or a peripheral card that adds a LocalTalk
port, along with supporting circuitry, in the computer.

2. Connect a LocalTalk connector box to the LocalTalk port on your computer.

3. Plug another LocalTalk connector box into the 8-pin LocalTalk port on the
back of your printer.

4. Connect the two connector boxes with a LocalTalk cable.

Or, if you are adding the LaserWriter to an existing network, connect the connector box on the printer to a LocalTalk cable already on the network.

5. To activate the AppleTalk software on the Personal LaserWriter, make sure the pushwheel switch (on the back of the printer) is set at 0.

For more information, see Appendix A, "Ports, Status Lights, and Switches."

Now you're ready to use your Personal LaserWriter NT. For more information, read the documentation that came with your computer and application programs.

Using the printer's 25-pin serial port

You can connect a Personal LaserWriter NT to your computer without using a LocalTalk card, but you'll need to match the communications settings on your computer and printer. (If you install a LocalTalk card, it does this matching for you.)

To connect your computer to the Personal LaserWriter, you connect a serial port (9-pin or 25-pin) on the back of your computer to the 25-pin serial port on the printer. This connection lets you send files from your computer directly to the Personal LaserWriter.

The procedure involves

- obtaining the necessary equipment

- connecting the cables

- selecting an operating mode (PostScript or an emulator)

- configuring your computer's serial port

- setting application software to match the printer's settings

Step 1: Obtaining the necessary equipment. To connect an MS-DOS computer to the Personal LaserWriter NT 25-pin serial port, you need

- a Personal LaserWriter NT

- an MS-DOS or IBM-compatible computer with a serial port

- an Apple Modem Eliminator (commonly called a null modem)

- an RS-232C serial cable (DB9 if you have a 9-pin port on your computer; DB25 for a 25-pin port)

Depending on your configuration of serial ports, cables, and modem eliminator, you may also need one or more of the following:

- a 25-pin to 9-pin serial port adapter (if you need to connect a 9-pin cable to the LaserWriter 25-pin serial port)

- female to male or male to female adapters (if the ends of your cables and adapters don't match up)

Different serial cables are wired differently. If you need help, contact your authorized Apple dealer when purchasing a cable.

If your computer has a standard serial port, such as those supplied with the IBM PC, you should be able to use standard cables. If not, you may have to purchase a special cable or have a cable built for you. Table F-1 provides a description of the pin assignments on the 25-pin serial (RS-232) port of the Personal LaserWriter NT. The person who builds your cable will need this information.

Table F-1   Pin assignments for the 25-pin serial port on the Personal LaserWriter NT

Pin	Circuit	Description
1 (or 7)	SGnd	Signal ground
2	Txd	Transmit data
3	Rxd	Receive data
4	Rts	Request to send
5	Cts	Clear to send
6	6DSR	Data set ready
8	DCD	Data carrier detect
20	DTR	Data terminal ready
22	Ring	Ring indicator

*Your Personal LaserWriter NT needs only pins 1 (or 7), 2, and 3, but a connected device may require the others. For example, to exchange information with an MS-DOS computer using the DSR/DTR handshake, pins 6 (DSR) and 20 (DTR) on the 25-pin RS-232 serial port of the LaserWriter must be connected to their counterparts on the serial port of the MS-DOS computer.

Step 2: Connecting the cables. Follow these steps to connect your computer to the 25-pin port on your printer. The port is on the back of the printer.

1. Make sure that both the Personal LaserWriter and your computer are switched off.

2. If a LocalTalk cable is connected to your printer, disconnect it.

3. Connect a cable to a serial port on your computer and then to the printer's 25-pin serial port.

If your computer has only one serial port and another device is already connected to it, you need to disconnect that device. You can buy and install an adapter that lets you attach both devices, or you can install a card that gives you a second serial communication port on your computer.

Your cable or cables should include one modem eliminator (also known as a null modem). Some serial extension cables have built-in modem eliminators.

If your computer has a 9-pin serial port, use a 9-pin to 25-pin RS-232C
adapter cable.

Step 3: Selecting an operating mode. You can use the pushwheel switch on
the back of your Personal LaserWriter NT to choose whether your printer
operates in PostScript mode (batch or binary) or emulates an Hewlett-Packard
LaserJet Plus or a Diablo 630 printer.

Table F-2   Switch settings

Switch position	Port	Meaning*
0	8-pin	AppleTalk, PostScript batch mode
	25-pin	Serial, no input
1	8-pin	Serial (9600), (N), (std), (1), (XON), PostScript batch mode
	25-pin	Serial (9600), (N), (std), (1), (XON), PostScript batch mode
2	8-pin	Serial (9600), (N), 8, (1), (XON), HP emulation
	25-pin	Serial (9600), (N), 8, (1), (XON), HP emulation
3	8-pin	Serial (9600), (N), 8, (1), (XON), Diablo emulation
	25-pin	Serial (9600), (N), 8, (1), (XON), Diablo emulation
4	8-pin	Serial 1200, N, std, 1, XON, PostScript batch mode
	25-pin	Serial 1200, N, std, 1, XON, PostScript batch mode
5	8-pin	Serial (9600), (N), 8, (1), None, PostScript batch mode
	25-pin	Serial (9600), (N), 8, (1), DTR, PostScript batch mode
6	8-pin	Serial (9600), (N), 8, (1), (XON), PostScript binary mode
	25-pin	Serial (9600), (N), 8, (1), (XON), PostScript binary mode
7	8-pin	AppleTalk, PostScript batch
	25-pin	Serial, no input

*For switch positions 1 through 6, the parameters are listed in the following
order: data transfer rate, parity check, number of data bits, stop bits,
handshake, and mode. The parentheses indicate that the parameter can be
changed. For more information, see "Checking and Changing the Printer's
Parameters" later in this appendix.

Your choice of setting depends on your software, the capabilities of your

equipment, and your preferences. For example, if your computer can communicate at 9600 baud, your software supports PostScript, and you want to use XON/XOFF protocols, choose setting 1; if you want DTR protocols, choose setting 5.

More information about the settings

Each setting serves a specific purpose, and it is likely that one of them meets all of your needs.

- If you connect the Personal LaserWriter to a Macintosh computer or to an MS-DOS computer with a LocalTalk card installed, use setting 0 or 7. (If you have just unpacked a new LaserWriter, the switch is preset at 0.)

- To use PostScript format in batch mode, use setting 1.

- To emulate HP LaserJet Plus format, use setting 2.

- To emulate Diablo format, use setting 3.

- If you are limited to a baud rate slower than the default 9600, use setting 4 (permanently set at 1200 baud). From this setting you can change the baud rate for other settings to accommodate your needs. (See "Checking and Changing the Printer's Parameters" later in this appendix.)

Diagnostic page: When the switch is in position 4 and you turn on the printer, it doesn't print the usual startup page. Instead it prints a diagnostic page showing the current parameters of each switch setting and other useful information.

- To use PostScript format with a DSR/DTR handshake, use setting 5. (The cable must be connected to the printer's 25-pin serial port. From this setting you can change other settings from the XON to the DTR handshake, if you prefer.)

- To send binary data using PostScript format, use setting 6. You can also use this setting to switch from PostScript to HP or Diablo emulation. (To do this kind of software switching you must install on your computer a driver that supports the binary serial protocol.)

Note: For more information about the pushwheel switch, see Appendix A, "Ports, Status Lights, and Switches."

You have now completed the physical connection between your computer and your printer. The next step is to configure the serial port and communications parameters in the computer and printer so that the two can interact. Basically, the goal is to make sure the computer and the printer are speaking the same language.

To configure the computer's serial port, you type commands at the DOS prompt as described in this section.

1.   Switch on the printer.

The Personal LaserWriter prints a startup page, indicating the format you've selected -- PostScript, Diablo 630, or LaserJet Plus. In addition, the page reports which connectors are set to receive information.

If the format or connector is not what you want, turn off the printer and reset the pushwheel switch. (See the previous section, "Step 3: Selecting an Operating Mode.") Then turn on the printer again.

2.   Start up your MS-DOS computer.

3.   Type the following two MS-DOS commands at the prompt.

MODE COM1:96,N,8,1,P MODE LPT1:=COM1:

The first command sets the data transfer rate at 9600 baud with no parity check. It specifies 8 data bits and 1 stop bit. This matches the computer's serial port settings to the default settings on the Personal LaserWriter. If 9600 baud is too fast for your computer, substitute a lower number (such as 12, for 1200 baud, or 24, for 2400 baud) for 96.

In the second command you identify as COM1 the serial port connected to the printer. If your printer is connected to the serial port you identify as COM2, substitute COM2 for COM1.

If someone has changed the settings in the printer, you'll need to type a different MODE command to match the computer to the printer. To find out what the printer's parameters are, see "Checking and Changing the Printer's Parameters" later in this appendix.

If you change the printer's parameters -- baud rate, parity check, data bits, or stop bits -- be sure to enter a new MODE command into your computer to match its serial communications to the printer's. (See your MS-DOS manual for a full description of the MODE command.)

Note: If you plan to use your printer often to print documents from your MS-DOS computer, include the two Mode commands in your AUTOEXEC.BAT file, the program that runs every time you start up your computer. This sets the printing parameters automatically each time you start up. (For more information about the AUTOEXEC capability, see your MS-DOS manual.)

The next step is to match the settings on your computer's application software to the settings on the printer. If any of the settings do not match, communication between the printer and the computer can break down, causing errors in your printouts.

Many application programs let you adjust the settings easily by picking them from menus, or simply by choosing LaserWriter as the printer. See the documentation that came with your application software for more information on setting communications parameters.

Some application programs may not have provisions for setting communications parameters, or they may not provide for all of the settings you have made on the printer. In such cases, you can set the printer to match the parameters specified by your program; for details, see "Checking and Changing the Printer's Parameters" later in this appendix.